TECHNOLOGY DEPARTMENT

February, 1949

THE FOUNDRY

wherever metals are cast...

Bourbon Furnace, Bath County, Kentucky, in 1791. Men with guns and a blockhouse were needed to protect ore diggers against warlike Indians.

INTERLUDE IN IRON MAKING . . . 1791

Dangerous and discouraging was the castings business in 1791. Indians sniping from behind rocks and trees . . . bog iron containing phosphorus and other weakening elements—such were the troubles which make those of modern foundries seem trivial. Yet hostile savages and impure ores didn't stop the supply of early castings.

Indians nowadays are no foundry problem, but it is still vital to reduce impurities in cast iron—a job made simpler with PURITE.

In the forehearth, or teapot ladle, PURITE reduces sulfur, permitting close control over refining. In the cupola, PURITE improves combustion, expels occluded gases, reduces oxidation, prevents sulfur pick-up, and washes out non-metallic impurities. The resulting better mixture of cupola iron, coupled with the refining, insures a clean, quiet pouring metal of uniform analysis . . . makes for lower losses, increased strength and improved machinability in the finished casting.

Write for more information about PURITE—what it is and how to use it. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.

Mathieson
PURITE

Purite (Fused Soda Ash) . . . Liquid Chlorine
Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua
Sodium Chlorite Products . . . Chlorine Dioxide
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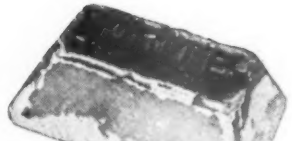

PURITE is commercially pure soda ash containing over 98% sodium carbonate, fused and cast into convenient 2-lb. pigs. Its desulfurizing and refining action are traceable to the chemistry of soda ash.

Omega is a fine-quality tool steel, whether judged by its composition or its dependable performance on cold-battering jobs. Its high shock-resistance makes it the top choice for pneumatic and hand chisels, core breakers and other shock tools.

Omega will keep your chisel costs down, whether you make up your own chisels or buy them already finished. It will stand up under the roughest kind of chipping work.

The cutting edge of Omega is sharp and durable. Shanks are tough and non-peening. And it's easy to re-dress and heat-treat.

Give Omega a trial on your toughest chipping and core-breaking jobs. Specify Omega and you'll have chisels you can always depend on for better cutting efficiency and lower costs.

OMEGA FOR SHOCK-RESISTANCE

- ★ Harden it in either oil or water.
- ★ Easy to forge, machine, heat-treat.
- ★ Unnotched Charpy: 130 foot-pounds.
- ★ Normal hardness of cutting edge: 58 to 60 Rockwell C.

★ Typical Analysis:	C	Mn	Si	V	Mo
	0.60	0.70	1.85	0.20	0.45

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
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★ BETHLEHEM STEEL ★

OMEGA... one of Bethlehem's Fine Tool Steels

100 LBS.
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GREEN BOND
IS A PURE WYOMING BENTONITE OF PROVEN, PRACTICAL QUALITY USED IN ALL CLASSES OF FOUNDRY SAND IN GREY IRON, MALLEABLE AND STEEL FOUNDRY PRACTICE
SOLD with SERVICE
Manufactured By
FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO.

In any foundry scenario, it steals every scene! FEDERAL GREEN BOND

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You Can Cut Costs, Boost Output... With LINOIL'S Uniform Performance

Painstaking care in assembly is the only pampering these cores receive. High speed production lines give cores a tough beating. Whatever the job—LINOIL pays off in sturdy, accurate, dependable cores.

Cores by the thousands...all shapes, sizes, and thickness... are mechanically conveyed from blowers through a 2½ hour baking cycle to the assembly lines. LINOIL assures quick baking, center-dried cores that are tough enough to withstand rough handling, even at ratios of 200:1 and 150:1

More than 69,000 pounds of cores per day are needed to keep the highly mechanized production lines at Spring City Foundry going full-blast. This huge volume of automotive cores is swiftly measured, mixed, baked, and transported largely by mechanical hands—leaving little opportunity for gentle handling or pampering on any core job.

Heavy emphasis on speed and performance puts the cores constantly "on the spot." Each batch must mix readily, blow and draw cleanly, bake clear through in a 2½ hour cycle. Cores must withstand frequent rough handling, yet retain the accurate dimensions required of high-quality automotive cores at lean ratios of 200:1 and 150:1.

With broken cores and rejects held to a minimum by LINOIL'S uniform performance—Spring City Foundry is assured 69,000 pounds of dependable cores a day for sound casting production.

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Water cooled cylinder block core assemblies coming out of the dip drying oven. Uniform performance in every batch of LINOIL cores assures accurate dimensions on the mass-production line.

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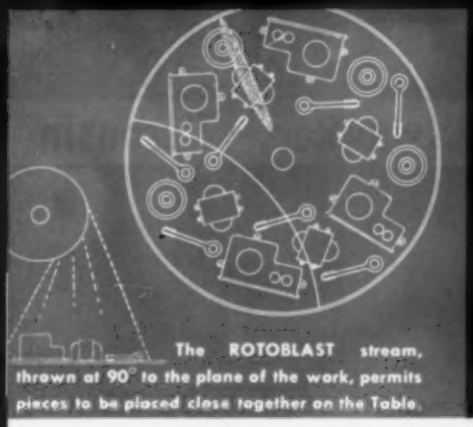
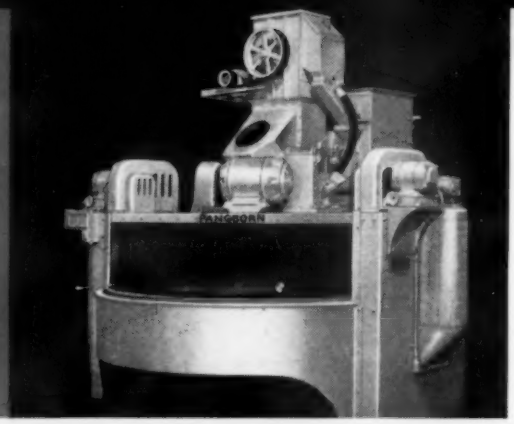
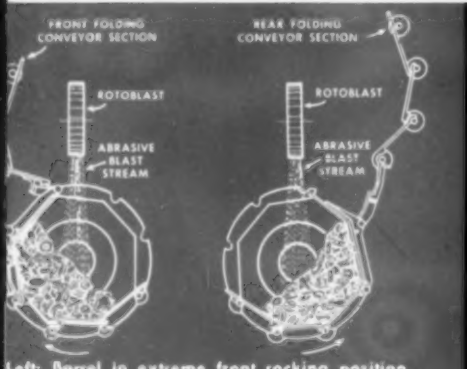


The ROTOBLAST stream, thrown at 90° to the plane of the work, permits pieces to be placed close together on the Table.



PANGBORN Rotoblast Tables for semi-continuous blast cleaning are available in many types and sizes to better fill your blast cleaning needs. For cleaning flat castings, the LF Table is the best choice. For castings with deep pockets, odd shapes or vertical surfaces, the LG Table has auxiliary work tables which rotate about their own independent axes on the main table orbit under a 45° blast stream.

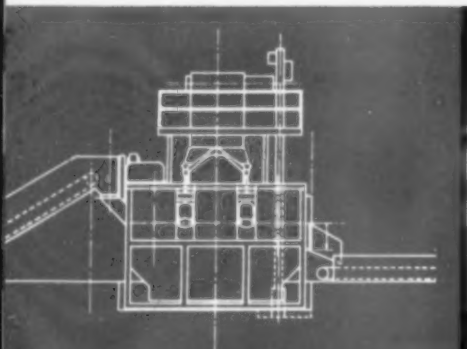
The "Turn-Style" Table, Type LH, allows simultaneous loading and cleaning as one of the two tables is always in the blast chamber. For general-purpose blast cleaning, the Pangborn Rotoblast "Table-Room" cuts jobbing foundry cleaning costs almost to the level of production foundries.



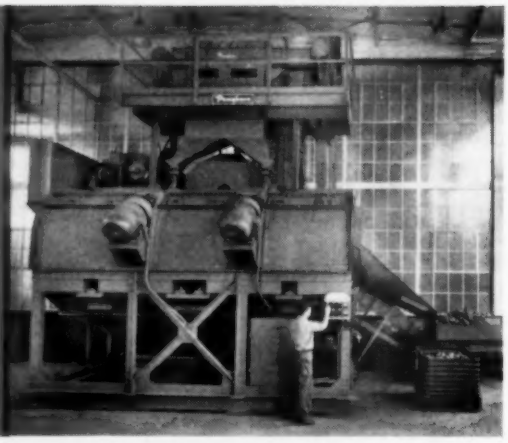
Left: Barrel in extreme front rocking position. Right: Barrel reverses to extreme rear, turning work under blast stream.

PANGBORN Rotoblast Barrels for top efficiency and economy in batch cleaning methods also offer a wide variety of sizes to fill every specific batch-blast cleaning job. These machines are famous for their cost-slashing performance because of their exclusive rocker barrel action which turns the work for complete cleaning on all sides under the Rotoblast stream.

Pangborn Rotoblast Barrels are available in capacities 3½, 7, 14, 17½, 21 and 28 cubic feet to fill the needs of large and small foundries. They are equipped with automatic abrasive recovery mechanism and are available with the Pangborn Automatic Loading Device.



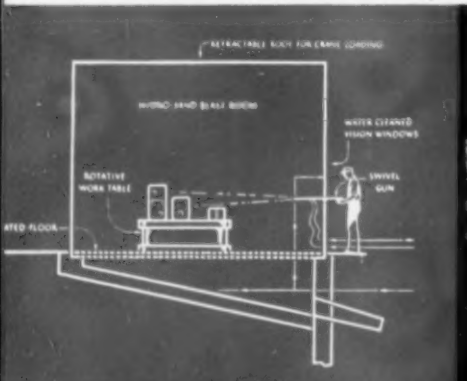
Side Elevation of the Pangborn Continuous-Flo ROTOBLAST Barrel



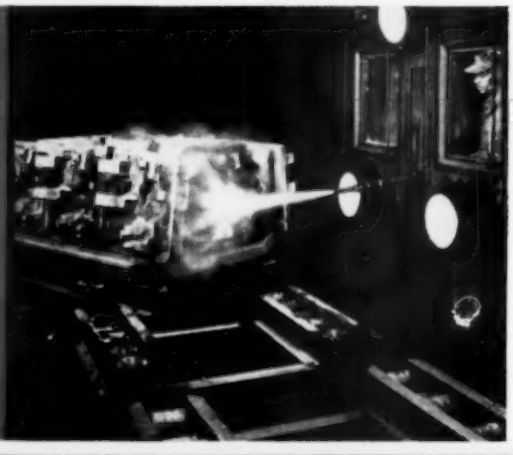
PANGBORN Continuous-Flo Rotoblast Barrel has at last accomplished production line blast cleaning, uninterrupted and an integral part of continuous materials handling.

This latest development in the centrifugal blast cleaning field by Pangborn has reduced cleaning costs approximately 40% below batch-type cleaning in a large foundry. This machine delivered cleaned castings 20 minutes after pouring . . . operated solely by one man. It's the newest, finest blast cleaning machine in the industry with an unduplicated performance record.

Castings are conveyed to the feed end, cleaned by two Rotoblast streams as they tumble through the rotating barrel, discharged ready for sorting and inspection.



Side Elevation of the Pangborn Hydro-Sand Blast and Core Knockout



PANGBORN Blast Cleaning Rooms fall into two major categories. The Hydro-Sand Blast Room simultaneously blast cleans and removes cores, without damaging core rods, by means of a high-pressure impelled stream of sand and water manipulated by the operator from outside the room.

Like the Hydro-Sand Blast Rooms, Pangborn Air Blast Rooms (not illustrated) are custom-built to specifications. Their primary application is to clean castings too large for Table or Barrel handling.

Pangborn

* Trademark of Pangborn Corporation

here's how

Pangborn

gives you faster, better cheaper blast cleaning

Here's the secret—no matter what your blast cleaning needs, Pangborn has the right equipment for every job. Perhaps a ROTOBLAST* Table will solve the cleaning problem that may be troubling you now. On the other hand, your specific task might require a Pangborn ROTOBLAST Barrel, "Continuous-Flo" Barrel, Air Blast Room or Hydro-Sand Blast Room. But in any case you can be sure of getting faster, better, cheaper blast cleaning with the right Pangborn Equipment for every job.

Pangborn Machines are serving vital roles in modern industry, speeding cleaning operations, obtaining better finishes at lower costs with less man-hours. Find out how your company can slash your cleaning costs with Pangborn Equipment. Send for the Pangborn bulletins that fit your needs. Just fill in the coupon below and mail to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control.

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☐ BARRELS ☐ TABLES ☐ ROOMS
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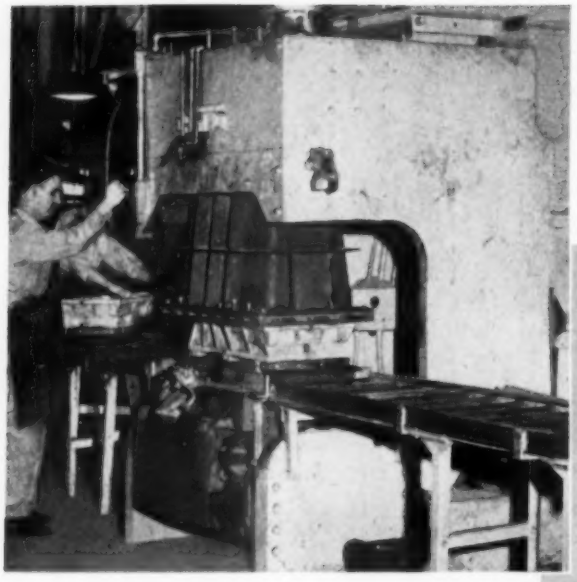
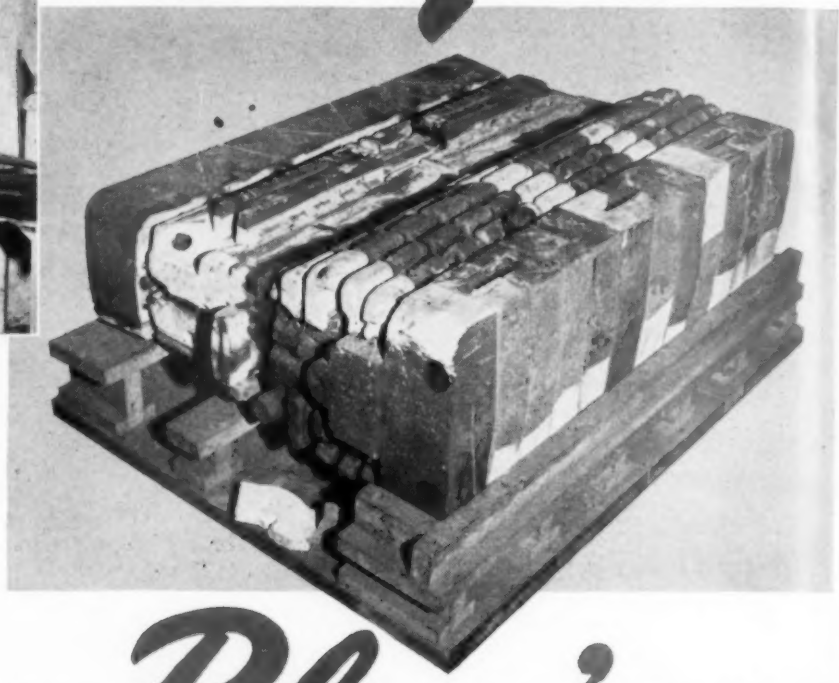
with the right equipment for every job



Seventeen pieces combine to form this 660-lb. core for International Harvester Diesel Engine casting. The largest sections, weighing nearly 60 lbs., are blown on the Champion CB-400, shown above.

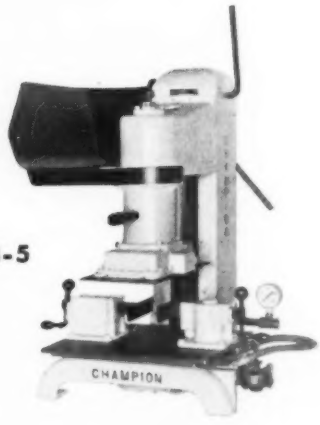
Big or



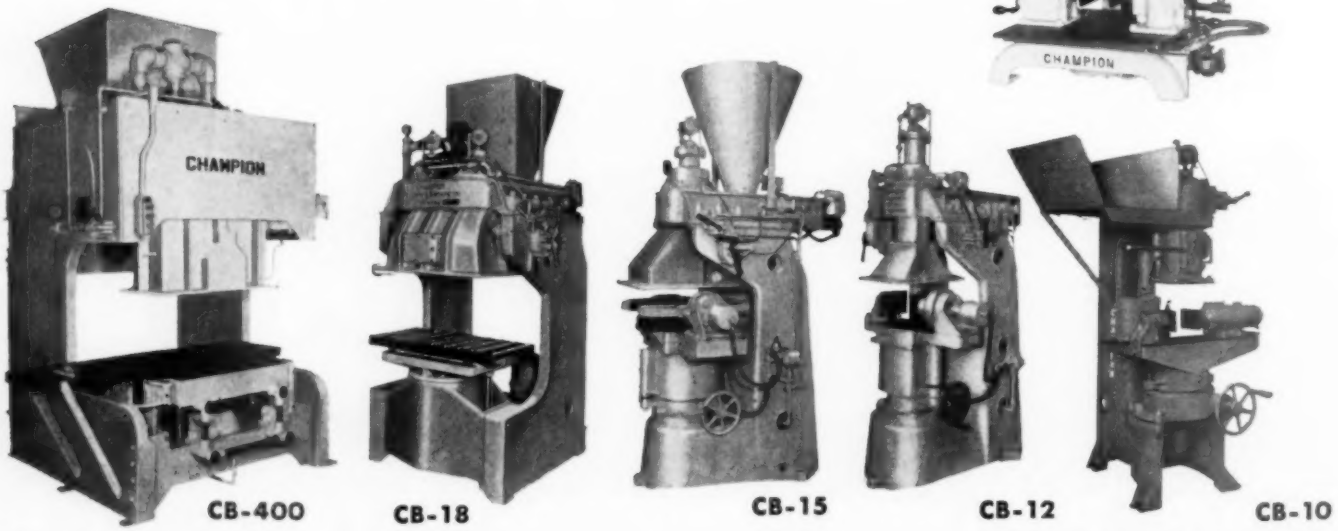
You can Blow 'em

How big did you say that core is? Never mind, there's a Champion Core Blower to handle it. Look at the line-up below, beginning with the daddy of them all, the CB-400, on down to "Junior", the CB-5, and whatever your requirements, one or more of these machines will fill those core boxes, and FAST! It takes no longer to blow 250 pounds of sand into a large core box on the CB-400, than to blow a gang of 2-ounce cores on the smallest model.

Try it yourself, and see!



CB-5



CB-400 CB-18 CB-15 CB-12 CB-10

Small-

Small, intricate shapes offer no problem when you blow them on a Champion. The cores and castings at the left, shown through courtesy of Federal-Huber, come out just as fast as the operator can manipulate the box and air lever.

all ON CHAMPIONS!

Every Champion core blower, from the largest to the smallest, possesses every feature that gives every Champion its outstanding speed, safety and precision. Operators using Champion Core Blowers find their work easy to learn and pleasant to perform. All effort is supplied by the machine, the operator merely directs and controls it. Hence there is no fatigue to slow down production toward the end of the day.

Size of core has negligible effect on the speed of blowing, and Champions turn out such uniformly accurate pieces that even the largest sectional cores are assembled without jigging or grinding.

Champion engineering, based on a vast experience, has provided the strength, accuracy and simplicity of operation on every size Champion Core Blower, that makes them favorites with operator and management alike, in leading foundries the world over.

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems. Champion molding machines, jolt squeezers, rollover and draw machines have the high productive capacity, the precision and ease of operation that make the big difference in profitable production. There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.

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GENERAL OFFICE AND PLANT, ROCKFORD, ILLINOIS

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ELECTRIC RIDDLES

See the *New*

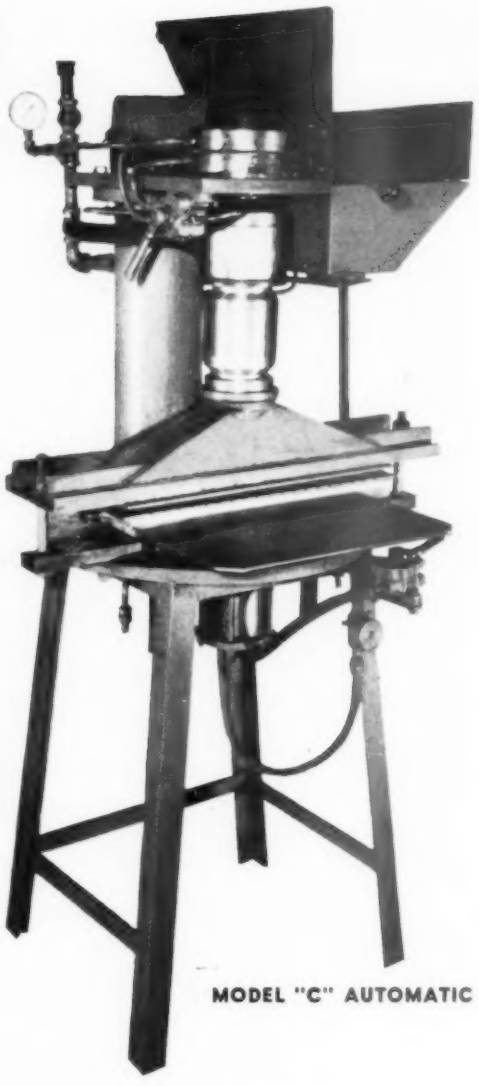
▪COR-BLO▪

AUTOMATIC

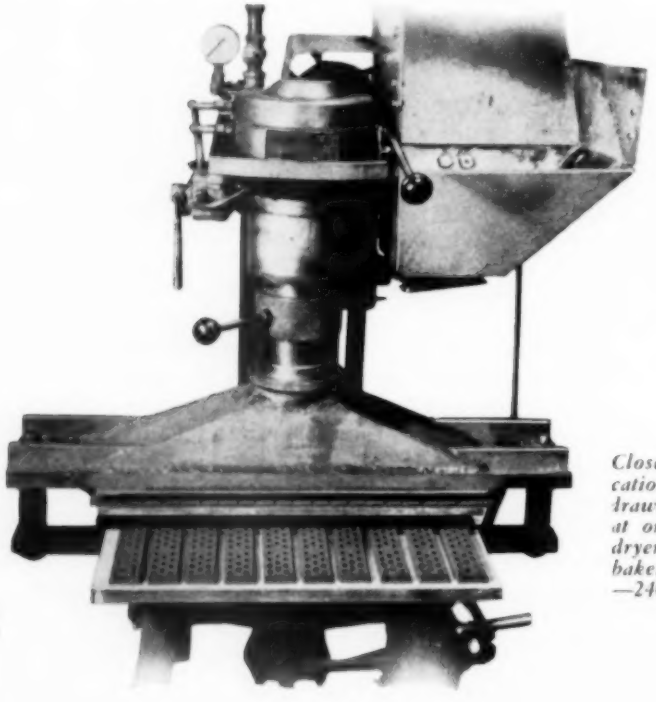
Patents and Trade Mark Applied For

Fully tested and proven in production of thousands of cores–all sizes and shapes

This new core blower combines many new features for the production of perfect cores faster and cheaper. Outstanding among the many features are the simplicity and strength designed into the machine to insure long life and easy upkeep. A comparatively small amount of air insures economy and uniquely designed, hardened and ground stainless steel, renewable valves assure trouble-free operation.



MODEL "C" AUTOMATIC



Close up showing application for blowing and drawing 10 GATE CORES at one blow, directly on dryer board and ready to bake. Cores are 1¾" x 6" —2400 per hour.

Other features contributing to the high efficiency of this core blower are: Large capacity, double chamber reservoir; swinging sand tube; stationary sand carrier for long core boxes; top half of core box fastened to bottom of sand carrier; cores blown directly into dryer; automatic, table drop vibrator and core draw; automatic, power operated sand tube; automatic hopper vibration.

MACHINES AVAILABLE

MODEL "B"—Hand Operated

MODEL "C"—Automatic

MODEL "D"—Duplex Automatic

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P. O. Box 67 **Wesleyville, Pa.**

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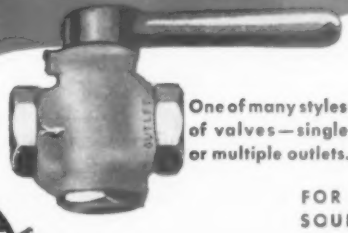

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Nipples in all commonly used pipe and hose sizes.

Steel or brass blow guns —lever or button style.

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FOR FASTER PRODUCTION OF...

Better, Cleaner Castings

STEEL, MALLEABLE, GREY IRON, NON-FERROUS USE...

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1. MORE PERFECT CASTINGS . . . 2. LOWER CLEANING ROOM COSTS . . .

3. LESS SCRAP IN MACHINING.

HERE'S WHY...

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.
The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

DELTA CORE & MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GREY IRON & MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-Hi-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
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• *Ask for a liberal working sample.*

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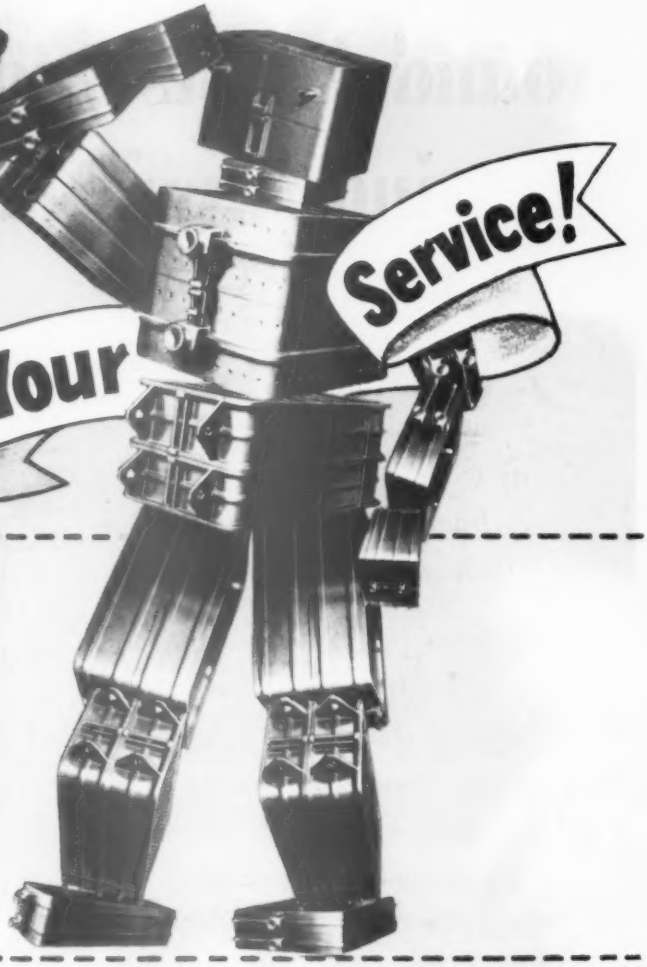

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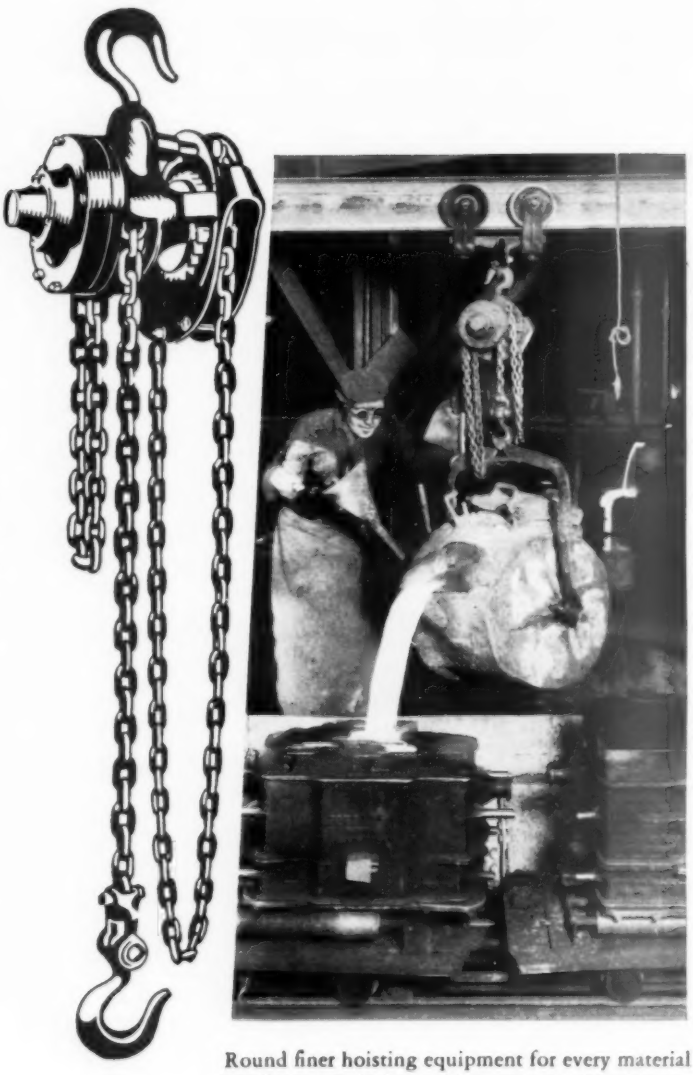

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CHAIN HOISTS

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Plain and Geared Types. Designed for use on either straight or curved I-beams.

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Above is No. 99 All Steel Winch. Capacity up to 5 tons. Many other types available for every lifting job.

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Whether your cores are for jobbing or production work, are large or small, bulky or delicate — you will arrive at the highest percentage of profit using time-tested, foundry-proved Smith L-O Core Oil. And, with 20 grades available, your production runs smoothly and efficiently because you select the *right* oil for the sand you use and type of metal cast.

The incomparable quality and good results of Smith Core Oil arise from the meticulous attention given to every detail when compounding. Our chemists are experts at eliminating variables during laboratory test-runs . . . these are factors which show up to your advantage under actual operating conditions.

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CORE WASH ROD DIP LIQUID PARTING

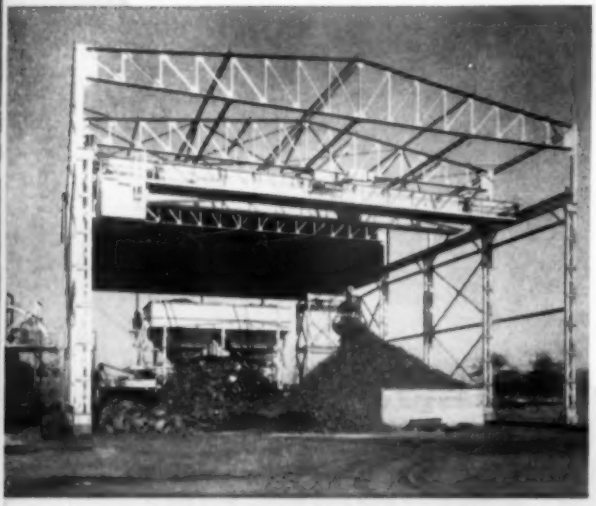
SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

2-Man Charging Crew for #9 Cupolas

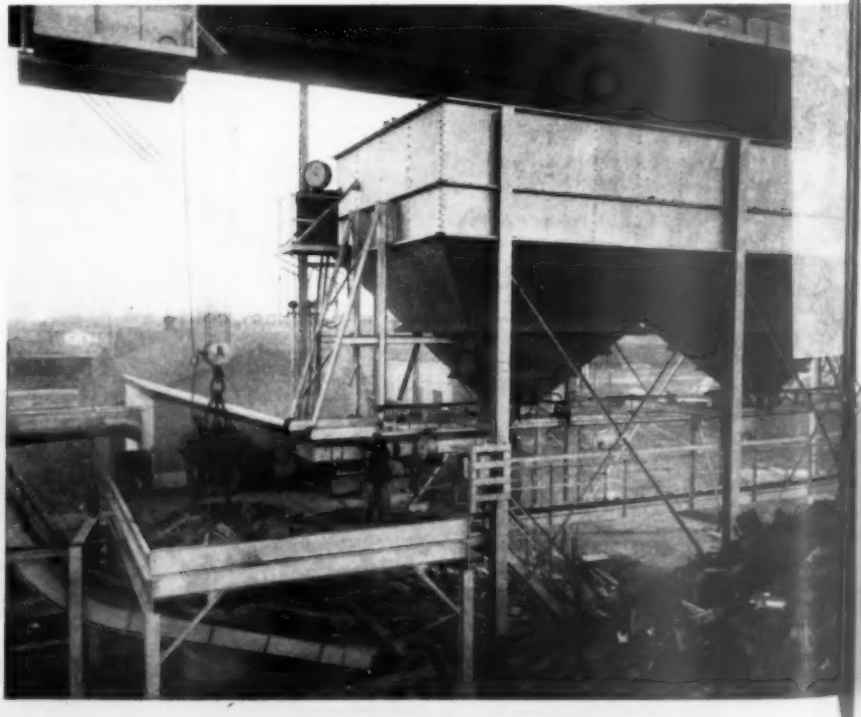
HOW WHITING MECHANICAL CHARGING SERVES THE KEEN FOUNDRY AT GRIFFITH, INDIANA

Planning for future expansion, the Keen Foundry has installed make-up equipment and a Whiting Swivel Charger to serve the #9 Cupola now in operation. The same equipment will also serve other cupolas as they are added, without requiring any increase in the present two-man charging crew. Such an installation can be designed to serve a battery of four cupolas—two being operated simultaneously each day while the other two are down for relining.

The Swivel Charger at Keen represents the most recent Whiting development, since it is designed so that either cone-bottom or drop-bottom buckets may be used. A full-cone-bottom bucket is now being used, as shown

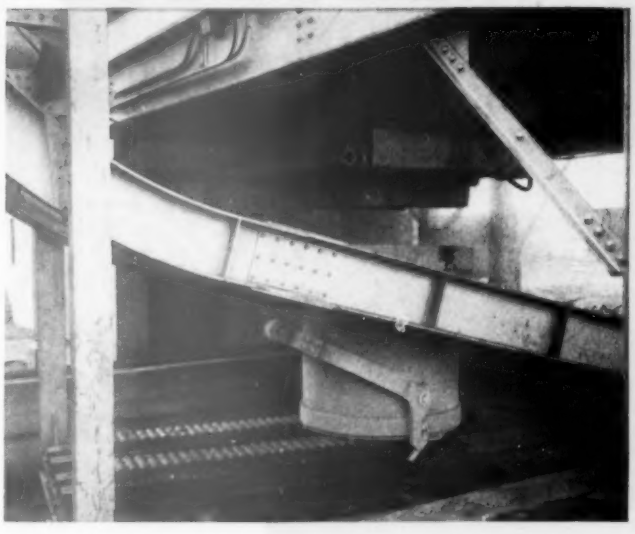


View of the Keen Foundry with materials yard in foreground. Crane with clamshell bucket is loading coke-and-stone bins.



Close-up of the charging operation. One operator handles the skip hoist, and also the motor-operated traveling coke-and-stone weigh hopper. The other operates the crane, making up metal charges and keeping coke-and-stone bins filled. The #2 scale is in full view of the crane operator as he makes up the metal charge. A second scale can be seen on the batch weigh hopper.

Two views showing operation of the automatic bucket-closing mechanism. At left the bucket is open—the cone about to come down against the rollers which raise it against the latch. Below, the bucket has closed and latched, ready to receive the next charge.

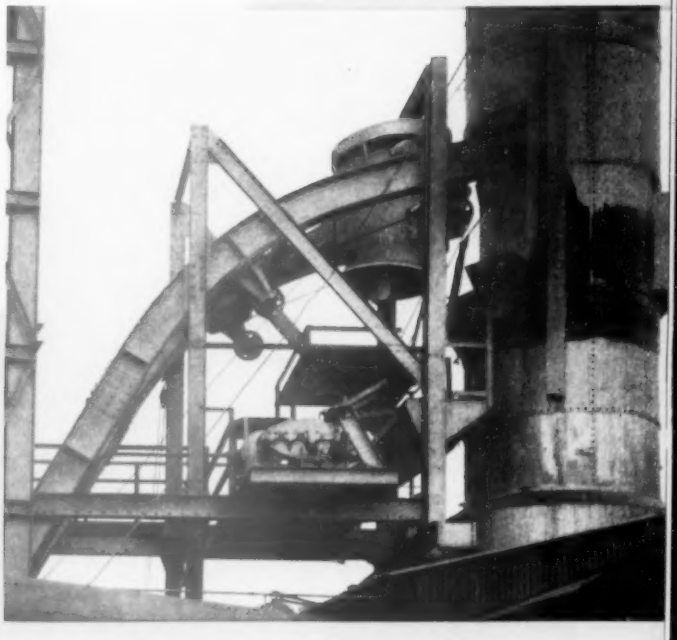


in the illustrations on this page . . . a bucket which, instead of employing the conventional "wishbone," is discharged by a release lever which opens automatically when the bucket is placed in position in the cupola, and closes automatically as it returns to position beneath the loading platform.

WHITING CORPORATION

15607 Lathrop Ave. Harvey, Illinois

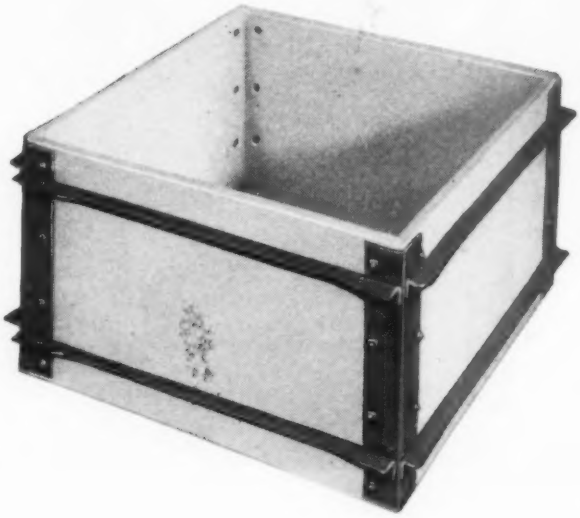
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.



The cone-bottom bucket emerging from the charging door, ready to descend the skip and receive another load.

Tapping the cupola into a U-ladle. Whiting is prepared to mechanize every part of foundry operation from "yard to ladle."

Are You Tired of Jackets that STICK?



CHANGE TO CMD NON-WARP, NON-BURN SLIP JACKETS

On jackets up to 8" deep, *Single* reinforcement angle irons are used.

On jackets over 8" deep, *Double* reinforcement angle irons are used.

They refuse to "fuse" but strip *clean* from the mold every time! CMD Slip Jackets shed molten metal like water off a duck's back. Made of Monasbestos one-half inch thick, these jackets won't burn.

Warping is prevented by strong corner irons 2" x 2" x 1/8", and cross reinforcing irons 1" x 1" x 1/8", which are bolted to the jacket and arc-welded in place.

Cut production delays with CMD Slip Jackets. They are your answer to lower jacket costs.

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Research leadership back of every Ingot

A practical, working knowledge of your problems . . . a superior product to meet them. These are the standards by which Apex Ingot is made . . . the reasons why foundrymen everywhere say,

"It's best in every test from Ingot to Casting!"

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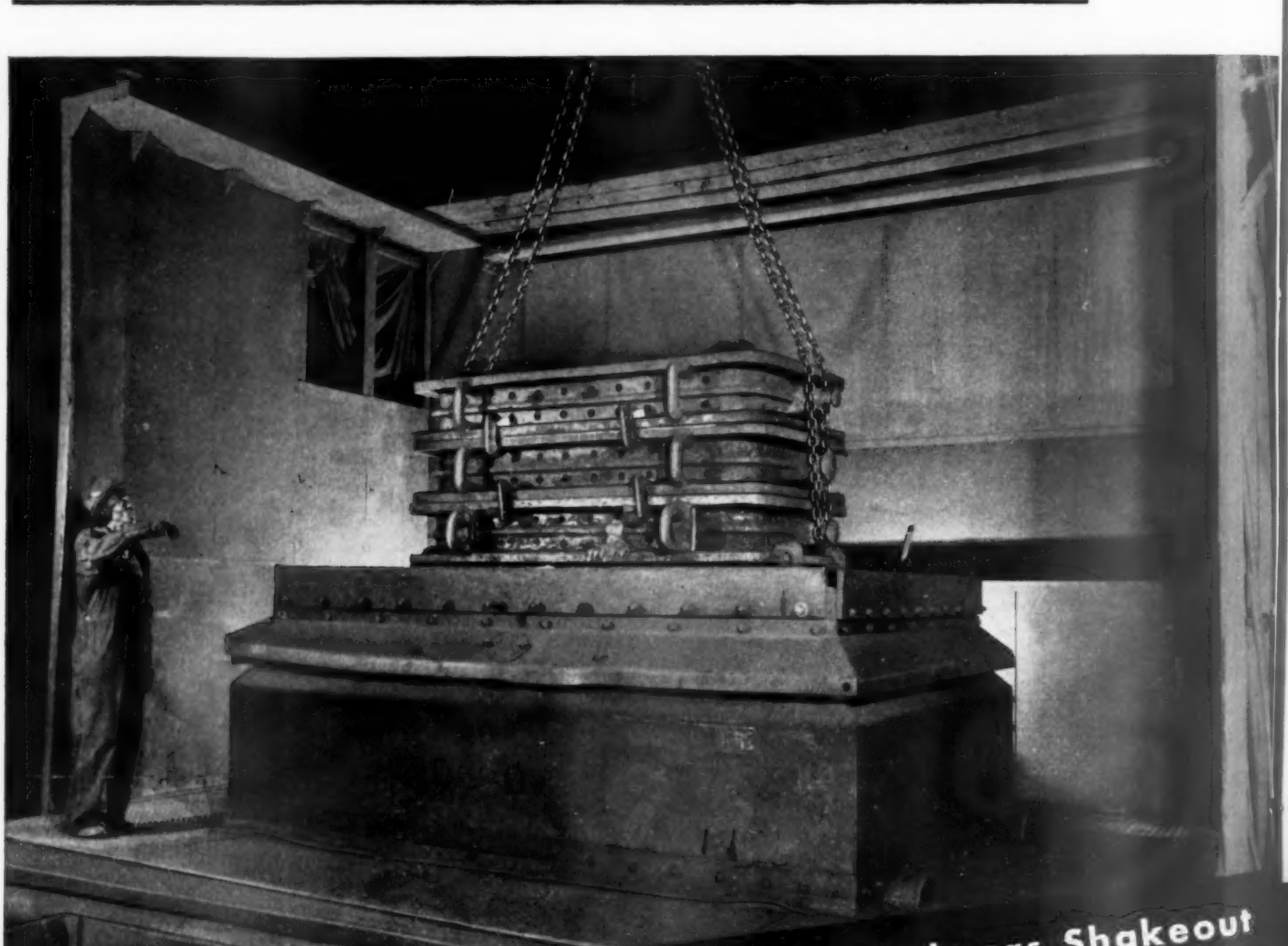
"Four Years of Trouble-Free Operation"

—SAYS FRED PRITZLAFF, FOUNDRY SUPT., FALK CORP.



"Since January 1945 This Allis-Chalmers Shakeout Has Provided Constant Service In Our Steel Foundry"

For Bigger Output-Better Working Conditions-Mechanize with...

YEAR-AFTER-YEAR DEPENDABILITY of Allis-Chalmers foundry equipment is proved by this 8′ x 10′ *Foundromatic* shakeout in the steel foundry of the Falk Corporation, Milwaukee, Wis. After four years of heavy-duty use this shake-out continually handles 25-ton molds. Falk foundry downtime and maintenance costs are kept at a minimum despite constant operation.

Foundromatic 2-bearing shakeouts are supplied in sizes from 4′ x 6′ with capacity of 4 tons through 8′ x 10′ with capacity of 25 tons. They can be operated in series or parallel combination for capacities up to 100 tons.

All Allis-Chalmers foundry equipment has been designed to cut production costs, better working conditions and reduce operating expense. A 2611

An experienced Allis-Chalmers representative will be glad to go over your foundry requirements with you. Consult your nearby A-C district office or write direct.

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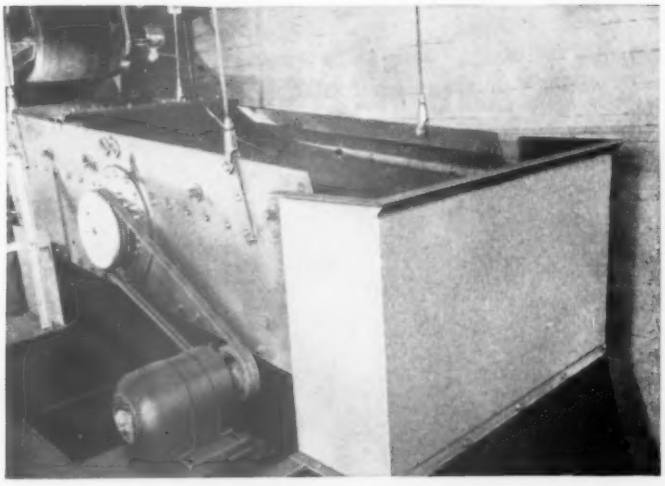
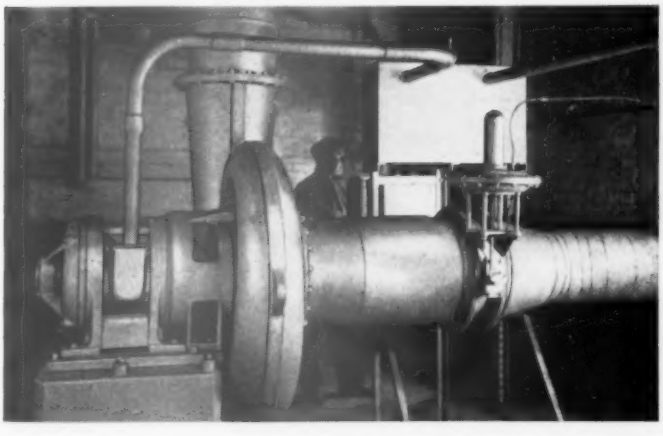
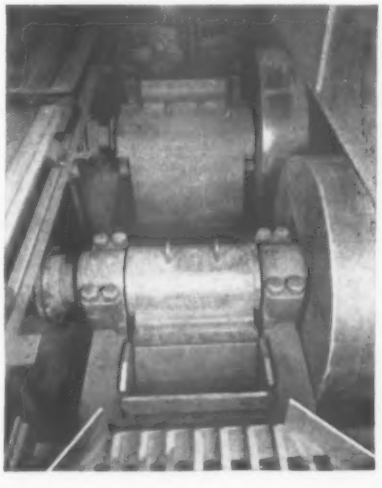


INCREASED SAND HANDLING CAPACITY resulted from installation of this 4′ x 10′ *Ripl-Flo* vibrating screen. The screen removes refuse, breaks lumps and aerates the shakeout sand. A belt conveyer brings the sand to the screen and then conveys it to the muller. These 2-bearing inclined type Allis-Chalmers screens are available in sizes 3′ x 6′ to 6′ x 16′. Designed with cable suspension or floor mounting.



CUPOLA EFFICIENCY IS ASSURED with an Allis-Chalmers single-stage blower equipped with constant air weight. The stable operation of this 10,800 cfm A-C blower has assisted in a record of high cupola performance due to efficient combustion. Hundreds of these blowers are proving through daily use that they reduce costs and improve casting quality.



BREAKING UP CORES after castings have been removed is a common application for Allis-Chalmers Fine Reduction jaw crushers. In the aluminum foundry shown here, seven A-C jaw crushers are used to break up cores. Nine tons per hour can be handled by each crusher. Compactly placed back to back next to the shakeouts, they separate steel rods from the molds with none of the difficulty experienced with machines formerly used.

Foundromatic, Ripl-Flo, Low Head are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment — Biggest of All in Range of Industrial Products

BULK MATERIALS HANDLING SIMPLIFIED

Foundry Sand • Coke
Limestone • Castings
Coal • Metal Scrap
Forgings • Cinders •
Barrels • Bales • Debris
• Snow.

HOUGH PAYLOADERS Designed to Handle Bulk Materials

Bulk materials of any kind can become bottlenecks in any plant. Are you equipped to scoop up, carry, lift and unload your mass materials quickly and cheaply? Do you require expensive containers for your ingredients, parts or bulk products in transit? How much do you handle with each operation?

Hough PAYLOADERS are designed and built just for this purpose — to move the largest quantities of bulk materials in a single operation—to operate in congested areas — with simplicity and speed. Scoop up your loose materials in PAYLOADER's even-keel bucket, move them without spilling in and out of box cars, through narrow aisle ways, and through mud and soft ground if you wish. Load your materials into any hopper, container or bin — high or low — by means of its dust and noise reducing dumping mechanism. PAYLOADER's hydraulically controlled dump release has numerous industrial advantages.

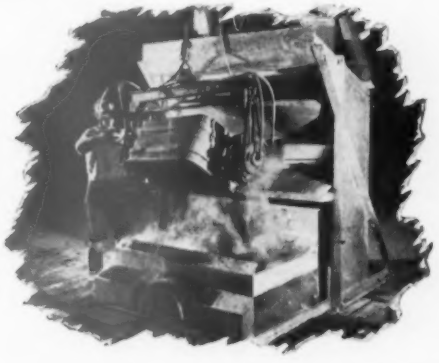
The same PAYLOADER unit which will really solve your major bulk material handling problems will likewise be an overtime workhorse for plowing and loading snow, cleaning yards, levelling waste dumps and grading. PAYLOADERS are dependable — because they are the result of materials handling experience since 1920. The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

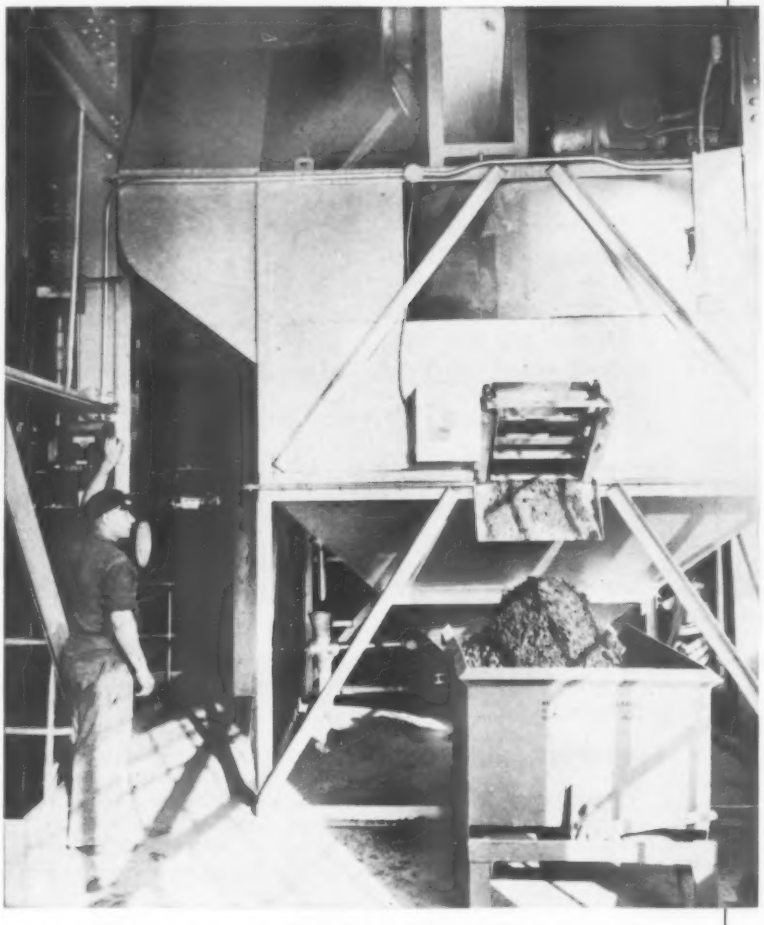
SEND FOR FREE LITERATURE on any of the four sizes of PAYLOADERS: the 10½ cu. ft. Model HA, the ¾ yd. Model HF, the 1¼ yd. Model HL or the 1½ yd. Model HM — also the 2 yd. Payloader Buggy

SAY "HUFF"

HOUGH
PAYLOADER
Mfg'd. by THE FRANK G. HOUGH CO.

The sludge tells the story of ROTO-CLONE'S efficient dust control





• *Fine dust collected by Type W Roto-Clone from shakeout is discharged as a mud-like sludge for easy disposal.*

• *Bulletin No. 274-A—gives the complete story about Type W Roto-Clone design and operation. It's free—write for a copy now!*

MINUTES ago the sludge shown at left consisted of millions of free fine dust particles of small micron size. They were released during the operation of the Link Belt 3x5 Shakeout pictured above. But before this dust could foul up the atmosphere, it was snapped up by the side-hood exhaust of a Type W Roto-Clone* (Arrangement C) and transformed into a harmless, easily disposed sludge.

The Type W Roto-Clone and AAF Shakeout Side-Hood combine all the features of complete dust control—confinement at the source, effective exhaust, high efficiency collection and discharge of consolidated sludge without creating a secondary dust problem. The Type W is a wet-type collector, combining water sprays and dynamic precipitation. Operation requires little water and no recirculating equipment.

Dust from shakeouts, sand conditioners and grinders; smoke and fumes from electric furnaces — all can be controlled effectively and economically with one of the many types of Roto-Clone equipment.

Write today for complete information or call your local AAF representative.

AMERICAN AIR FILTER COMPANY, INC.
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MEMBER AIR FILTRATION EQUIPMENT

ROTO-CLONE®
DUST CONTROL EQUIPMENT

*Roto-Clone is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.

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IN addition to providing a full line of high-quality ferro-alloys and alloying metals, Electro Metallurgical Division serves steelmakers in other important ways:

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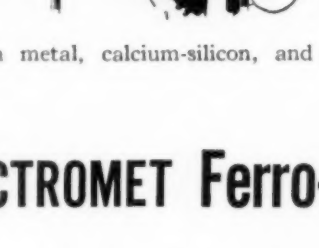

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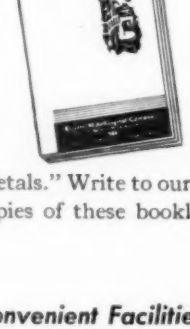
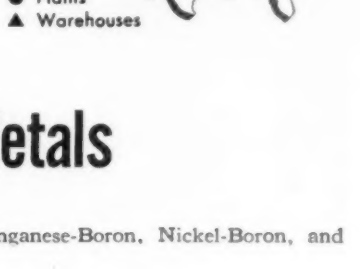


Technical Booklets—You will find helpful information about ferro-alloys and metals in ELECTROMET'S free technical booklets and reprints. Among these are "ELECTROMET Products and Service" and "ELECTROMET Ferro-Alloys and Metals." Write to our Technical Service Department to obtain copies of these booklets.

Convenient Facilities— You can count on prompt and efficient service from ELECTROMET, since our offices, plants, and warehouses are conveniently located to serve you.



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Information about these and other alloys and metals produced by ELECTROMET is contained in the booklet, "ELECTROMET Products and Service." Write for a copy.

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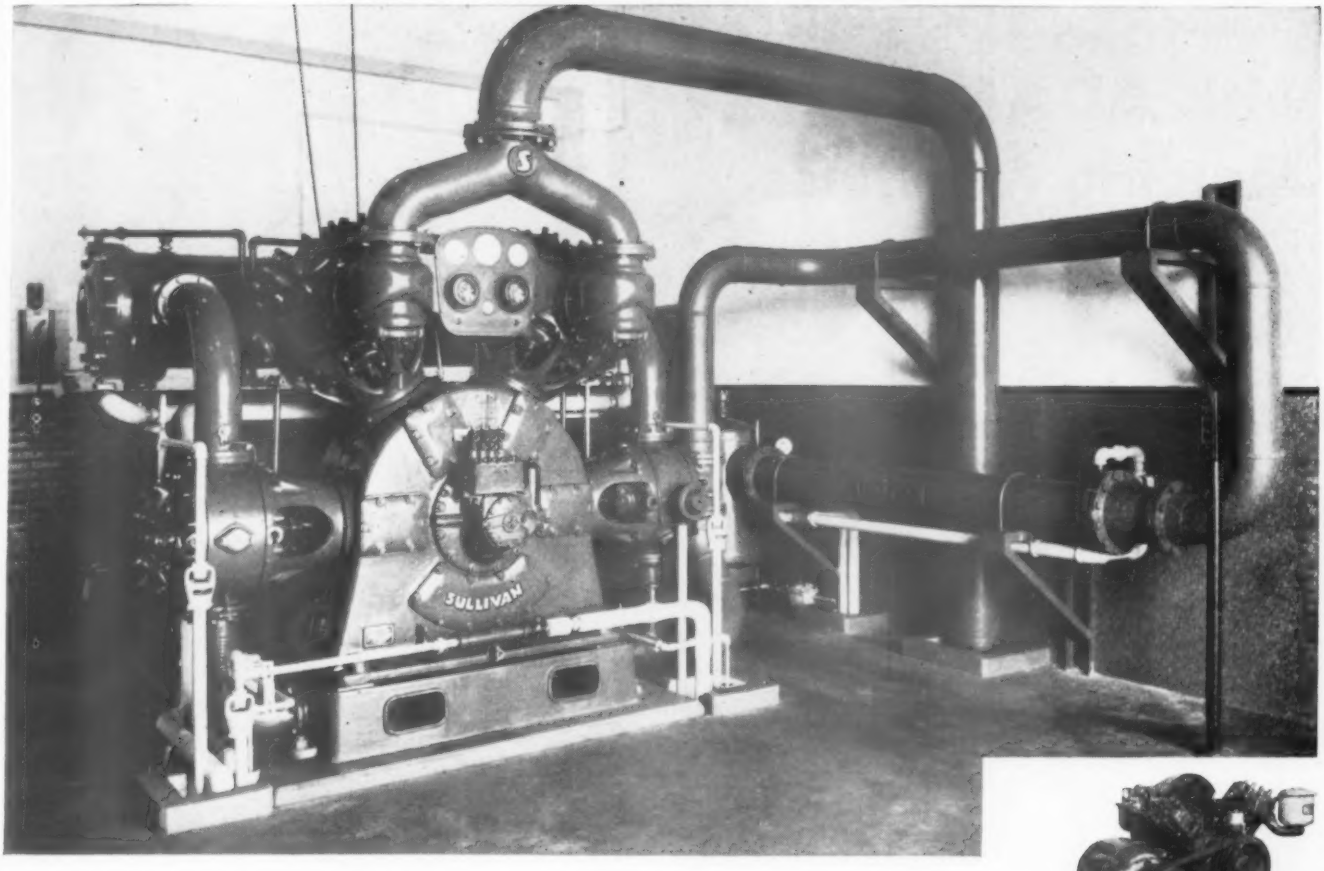
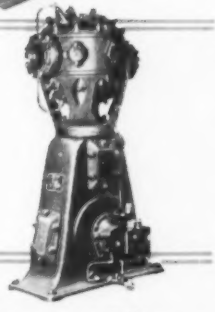


JOY WN-114 COMPRESSOR

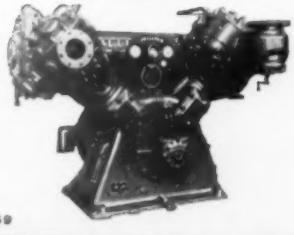
The JOY WN-114 is a four-cylinder, two-stage, double-acting compressor producing 1092 to 3656 CFM in single units, and up to 7312 CFM in twin units, depending on pressure. Exclusive "Dual-Cushion" valves provide top efficiency in low-cost air power. ● JOY builds the most modern compressors available for either centralized or decentralized air supply—*write for Bulletins.*

Consult a Joy Engineer

The JOY WL-80, in 9 sizes from 81 to 590 CFM.



The JOY WG-9, in 11 sizes from 153 to 822 CFM.



The JOY WN-112, in sizes from 378 to 1828 CFM.

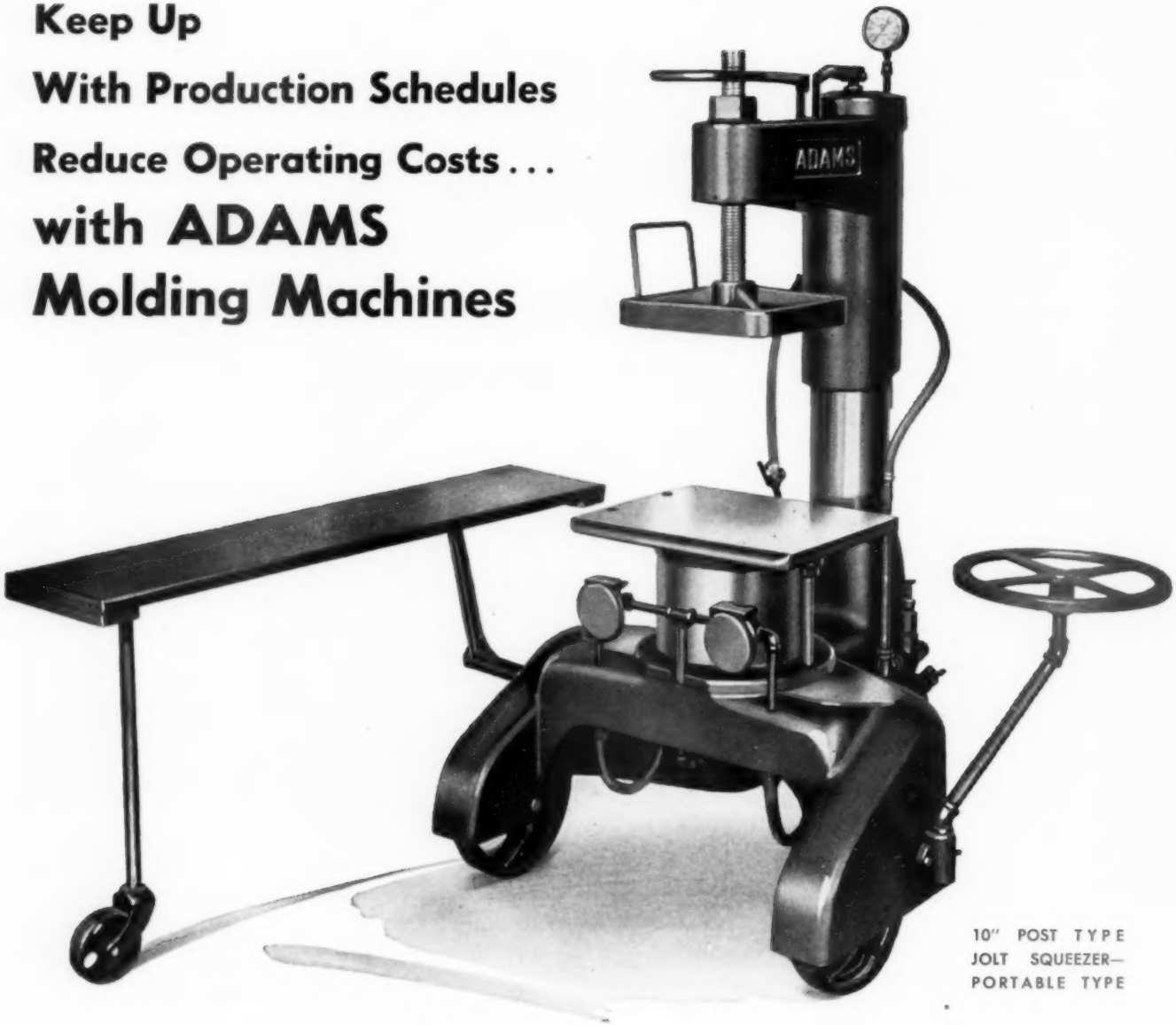
W & D I 2059

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Keep Up
With Production Schedules
Reduce Operating Costs . . .
with ADAMS Molding Machines



10" POST TYPE JOLT SQUEEZER—PORTABLE TYPE

All-out production—You'll get just that with Adams fast, accurate molding machines—and at lower costs! Their speed, stamina and power, plus simplified design for easy operation, help maintain steady, high output levels even with unskilled labor. Losses are limited by the close control of jolting and squeezing operations which assure accurate, uniform molds.

Here are some of the features that lower production costs—Minimum working parts, protected against sand and dust—convenient, accessible operating controls for quick handling—great flexibility—low maintenance costs. Adams molding machines give dependable, long term service. They stand up to the pressures of high production, maintaining their efficiency and accuracy throughout prolonged hard use.

SIZES AND TYPES
FOR ANY SQUEEZE MOLDING
REQUIREMENTS

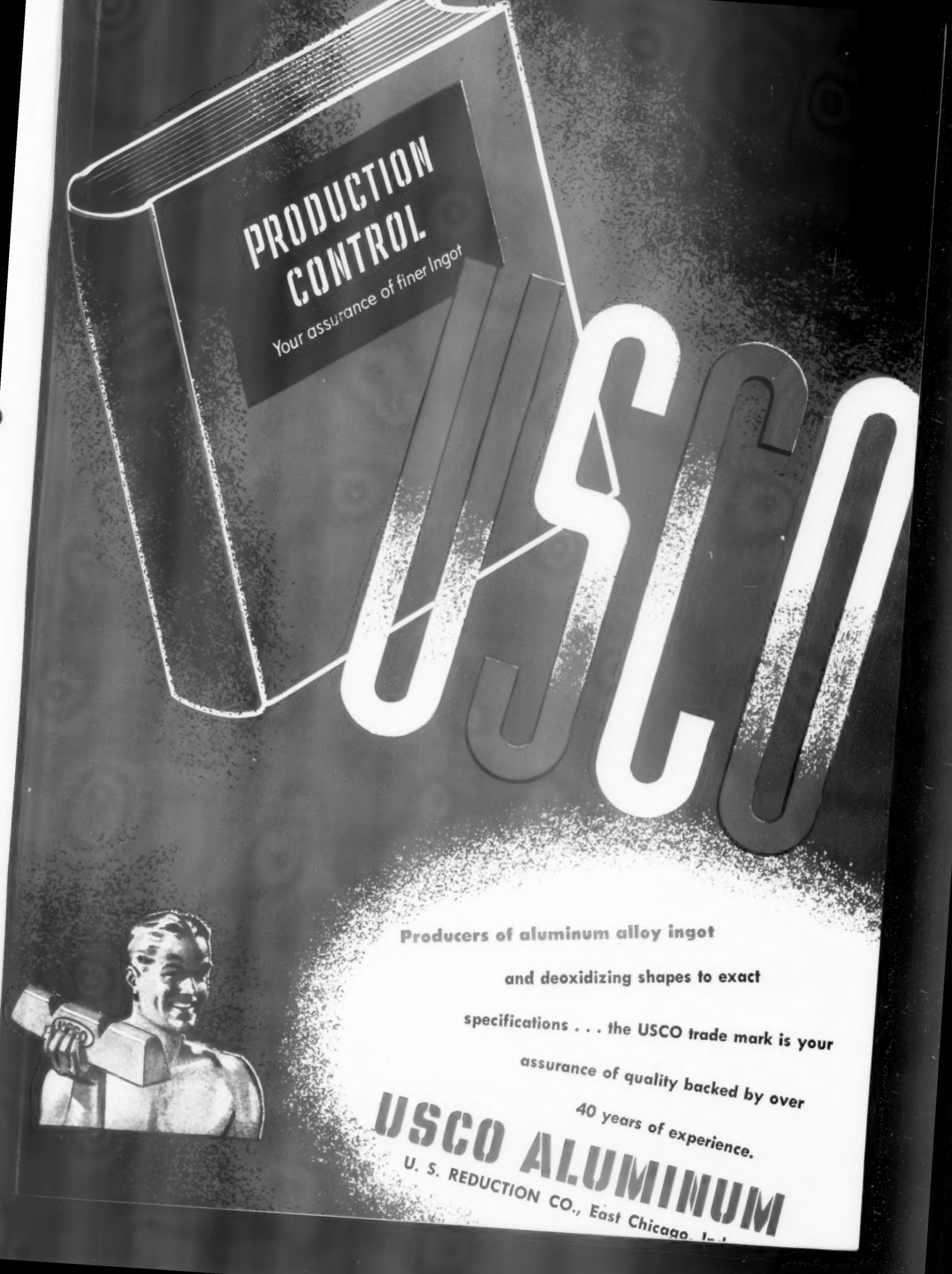
Side Rod Type and Post Type—Jolt Squeeze and Jolt-Squeeze-Pattern-Draw-Styles—Stationary and Portable-Hand Squeezers. Write today for full details in Catalog No. 705. THE ADAMS COMPANY, 700 Foster St., Dubuque, Iowa.

The ADAMS Company

ESTABLISHED 1883

DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT



Producers of aluminum alloy ingot and deoxidizing shapes to exact specifications . . . the USCO trade mark is your assurance of quality backed by over 40 years of experience.

USCO ALUMINUM

U. S. REDUCTION CO., East Chicago, Ind.

Tabor's *Shockless Jar* pays off at Link-Belt

PICTURED at right is a Tabor 30″ Jar, Power Rollover, Power Draw machine installed in the core room at Olney Foundry of Link-Belt Company. This machine is *completely shockless* during jarring operation, since *no part* of the jarring blow is transmitted to the rest of the machine or to surrounding floor area—*an exclusive Tabor feature.*

The photos tell the pay-off story:

(1) Operator is jarring the next core while preceding one—safe from "breakdown"—rests on receiving table awaiting convenient removal. Time is saved.

(2) Racks of rammed, unbaked cores can be placed right next to the machine without danger of core collapse. Shorter carry. *More* time saved.

(3) Makes more cores per day. Tabor's shockless design works on the principle of table and anvil meeting in "mid-air". Piston travel is halved, and so is jarring time—*without decreasing the effectiveness of jarring blow.*

(4) It all adds up to more cores or molds in less time at a lower unit cost.

Tabor shockless jar machines are *unequalled* for upper floor installations. Floor construction need only be strong enough to carry dead weight of machine and mold. Saves expensive shoring. Saves floor space. Eliminates vibration damage to building.

Tabor's shockless feature is available on our 22″, 30″ and 40″ Rollovers and on their high-production mates, the 22″ and 30″ Jar Flask Lifts. Also available on practically all of our Flask Lift units, with or without squeeze—in fact, nearly all standard Tabor machines can be shockless-equipped.

May we show you how *your* set up—ground floor or upper floor—can be made more hurried and less harried the Tabor *shockless way?*

REPRESENTATIVES

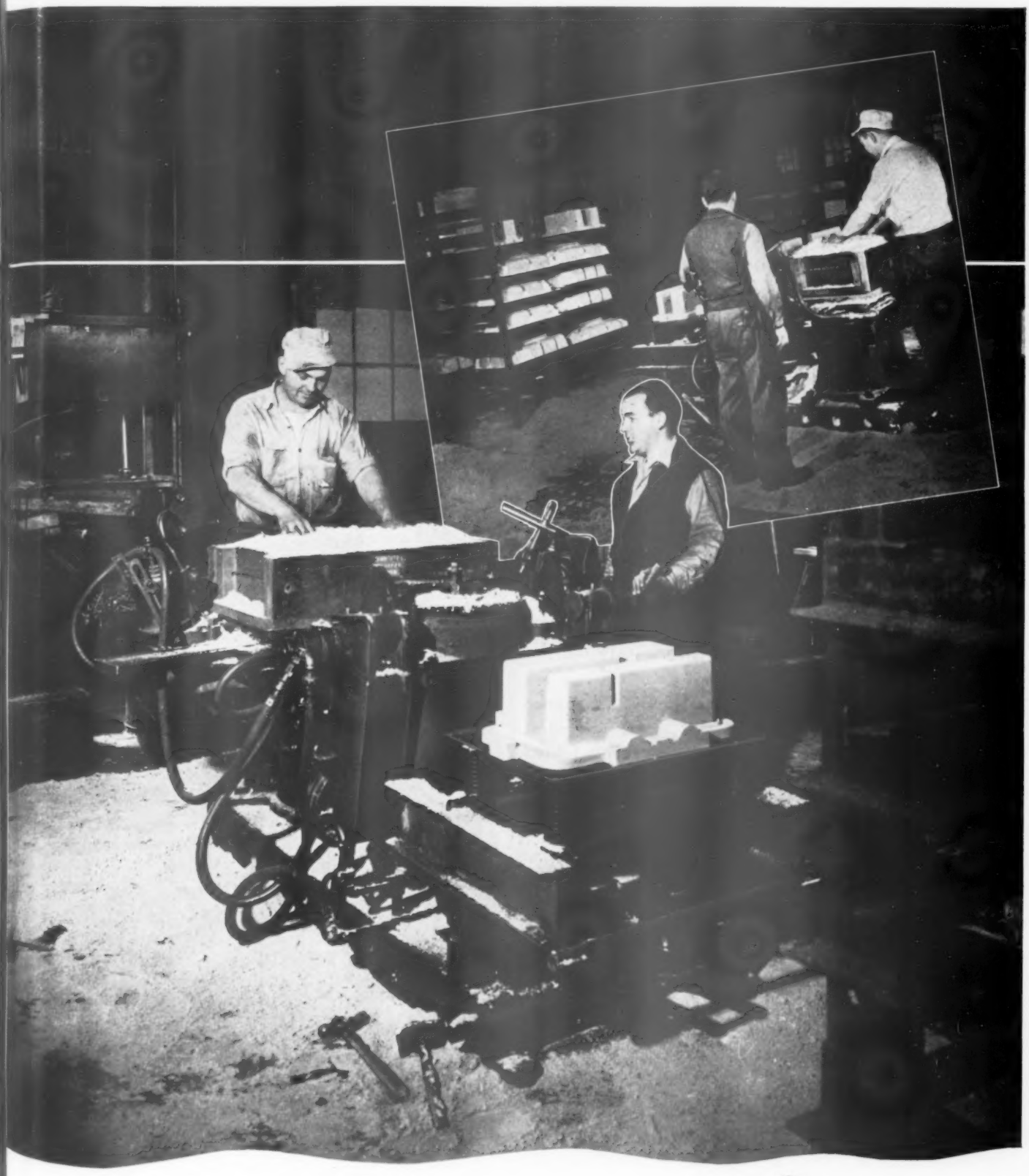
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.

The TABOR *Manufacturing C*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

save labor . . .



. . . . buy *Tabor*

FOUNDRY MANUFACTURER'S ASSOCIATION, INC. EQUIPMENT

Since these boxes Weigh 2/3 Less

HOW MUCH FUEL CAN YOU SAVE

in each heat-treating cycle?

The solution of the above question is an obvious one. Let's say that in each furnace cycle the fuel consumed in heating the metal itself of the cast iron boxes, pictured at the right above, is $60. Then, since the "Pressed Steel" sheet alloy boxes, pictured at left, weigh 2/3 less, a carload of them could be heated for roughly $40 less. When this substantial amount is multiplied by the number of heats in a year it develops into a real slash in production costs.

If this possibility of fuel savings has not been canvassed may we suggest that the number of BTU's consumed in heating your annealing or carburizing equipment be computed. The possible savings may point up a reason why, for example, 80% of the nation's heat treaters use "Pressed Steel" carburizing boxes. As pioneers of light-weight sheet alloy heat treating equipment, we offer you a wealth of experienced engineering assistance and production know-how. Send blue prints or write as to your needs.

THE PRESSED STEEL CO. *Light-Weight* Heat-Treating Equipment SAVES 4 WAYS

Require less fuel and time to attain pot heat. Handle easier. Last from 2 to 20 times longer. Save space, increase furnace capacity.

"Pressed Steel" light-weight sheet alloy heat-treating units are furnished in any size, as well as in any design or metal specification. Complete line of equipment for every purpose: annealing and carburizing boxes, covers, baskets, racks, tubes, retorts, etc.

THE PRESSED STEEL COMPANY

of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

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If your requirements can be satisfied only by new concepts or special adaptations of more or less standard products, let us co-operate. Today, all Electro Products are the result of specialized research and development; and most of our activities are routed from job-side *studies* by our Field Engineers to our Engineering or Chemical Laboratories, then back to job-side *application* by these same Field Engineers.

"Field Engineers" is not a loose term with us to falsely glorify specialty salesmen. Every one of these men came to us from a technical institution; was then given additional training in Electro's Laboratories and Departments; and finally assigned to co-operative work in various industries before promotion to Field Engineer. These are the bases of their competence to work with you in the solution of your Specific Problems.

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CERAMIC —Potteries: Art Potteries: Manufacturers of Grinding Wheels: Sanitary Ware: Floor and Wall Tile: Electrical Porcelain; Miscellaneous Ceramic and Enamel Plants.

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ABRASIVE WHEELS —Resin-bonded, High-Speed Grinding Wheels to cover nearly every conceivable use from snagging and cutting-off operations to fine precision grinding.

CRUCIBLES —(Tercod-Conqueror) Pedestal Blocks and Pot Lids—The Carbon-bonded Crucible for melting aluminum—nickel—copper—the brasses and bronzes—zinc—silver—gold—iron, using any fuel: oil, gas, coke or coal, electricity.

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CERAMIC KILN FURNITURE—Slabs and Posts for rigid, floating or semi-floating open construction; plate setters, tile setters, sanitary ware setters and silicon carbide saggers.
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CRUCIBLE FURNACE FURNITURE—Linings, covers, insulation, burner blocks.
PYROMETER TUBES—And tubes for other purposes.
BRICK—9" series or special shapes to individual specifications.
BURNER BLOCKS—Electric furnace door blocks, door frames, port blocks and electrode sleeves.
STOPPER HEADS—For steel ladles; also slag hole and tap hole blocks for Cupolas.

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ALLOYS —Special compositions for additions, deoxidation, degasification, purification: Copper—Aluminum—Chromium—Titanium—Nickel—Silicon—Iron—Magnesium—Lithium—Calcium—Calcium Boride—Tin—Zinc—Lead.

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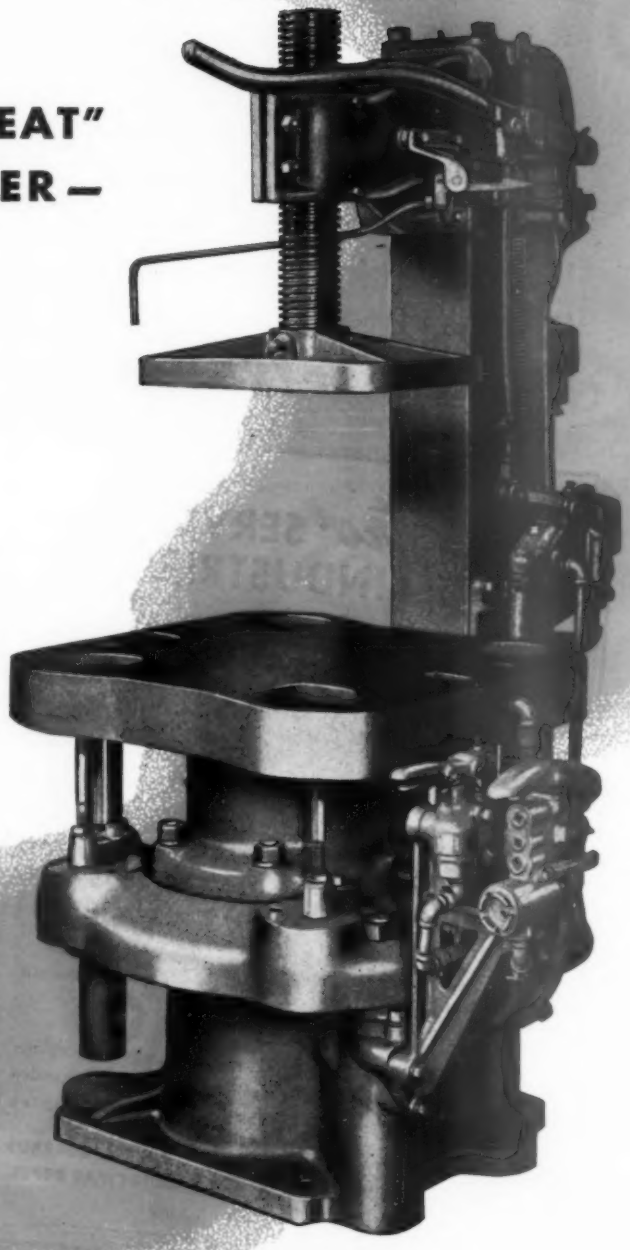
Watch this STRIPPER Perform!



MILWAUKEE'S "TRIPLE THREAT" JOLT SQUEEZE PIN STRIPPER—

If you want to put your foundry jobbing work on a really fast production basis, it will pay you to investigate this versatile Jolt Squeeze Pin Stripper. In addition to operating as a Pin Stripper, it can be used as a Pin Lift machine . . . or merely as a Jolt Squeezer. Virtually three machines in one.

The drawing mechanism can be operated on the exhaust of the squeezing stroke as a Stripper, or as a separate operation after squeezing as a Pin Lift. The machine handles simple, inexpensive pattern equipment, enabling you to put troublesome short-run jobs on fast production schedules.

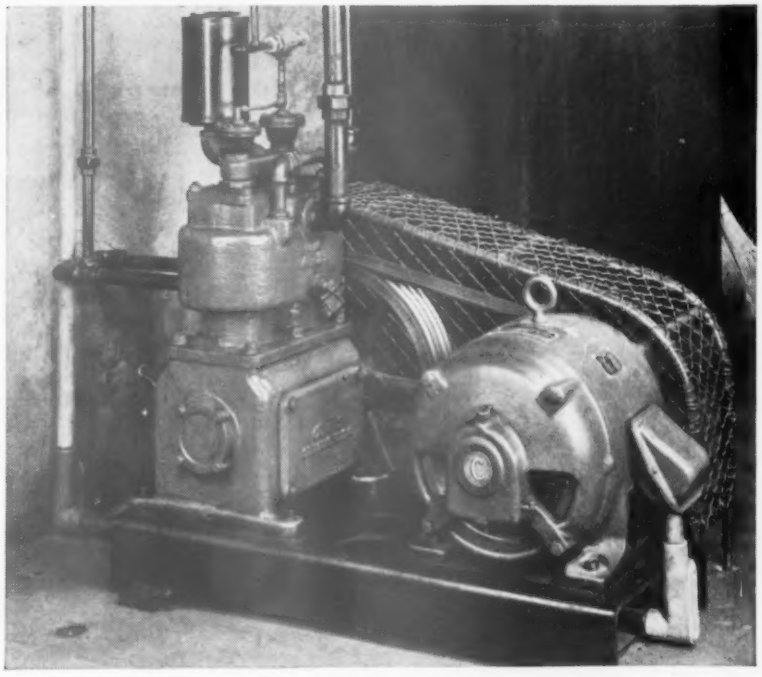
New MILWAUKEE "PAY-FROM-PROFITS" PLAN

Order a Milwaukee Stripper for immediate delivery. Under our new "PAY-FROM-PROFITS" plan, no substantial cash outlay is required. Actually you pay for the machine out of the profits derived. Enables you to replace old, obsolete machines with faster, modern equipment, *without impairing your cash position.* Write today.

MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

Curtis Timken Bearing Air Compressor. Sizes from ¼ to 50 H. P., inclusive.



RELIABILITY
That Pays Off in Low-Cost Performance

CURTIS TIMKEN BEARING AIR COMPRESSORS

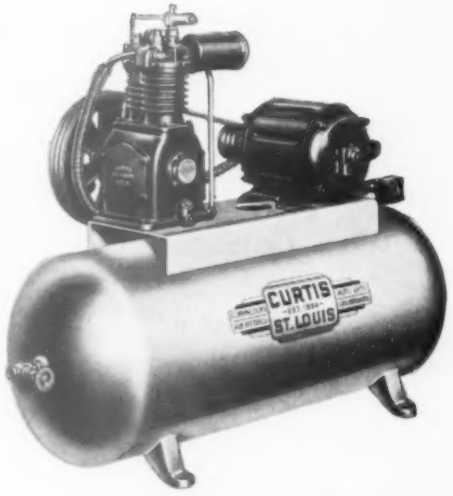
WHATEVER the application, in thousands of varied industrial installations, Curtis Timken Bearing Equipped Air Compressors have a long and proven record of extreme reliability, low maintenance expense and unusually long life.

Every Curtis Air Compressor has been carefully engineered, made of the highest quality materials and precision built throughout.

Their dependable, economical performance is the result of such design advantages as:

- Timken Roller Bearings
- Self-Oiling—Positive Lubrication
- Carbon-Free Disc Valves
- Automatic Pressure Unloader
- Fully Enclosed Design
- Precision Construction

Specify CURTIS when you want a reliable, low-cost supply of air for *any* use. Capacities from ¼ to 50 H.P. (up to 300 CFM).



Curtis Timken Bearing Air Compressor with tank. Sizes from ¼ to 10 H.P., inclusive.

Write today for full information on Curtis Air Compressors, Air Hoists and Air Cylinders—or mail the coupon below.

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PNEUMATIC MACHINERY DIVISION

of Curtis Manufacturing Company

1922 Kienlen Avenue - - St. Louis 20, Missouri

95 Years of Precision Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION *of Curtis Manufacturing Company*
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Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

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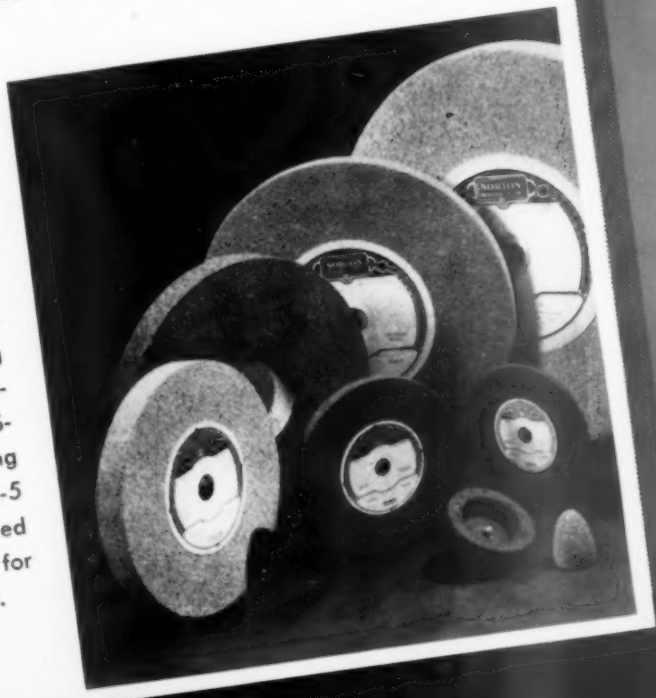
- the same wide variety of products
- backed by the same extensive research facilities
- backed by the same manufacturing skill in a modernized plant
- now marked by a modernized version of the familiar Norton trade-mark

Every Norton product—from Worcester as well as from the Behr-Manning division at Troy—will bear this symbol of Norton quality.

Look for it on the complete line of Norton abrasive products for the foundry.

Grinding Wheels—There's a Norton wheel that's exactly right for each of your portable, floor stand and swing frame grinding jobs, whether you're grinding castings of steel malleable iron, gray iron, brass, bronze, or aluminum. Fast, cool-cutting action is assured by three different outstanding Norton abrasives trade-marked ALUNDUM, 57 ALUNDUM, and 37 CRYSTOLON. And smooth, clean-cutting action is provided by the Norton B-5 and B-7 resinoid bonds for high-speed operations and by vitrified bonds for grinding speeds up to 6500 s.f.p.m.



Abrasives • Grinding Wheels • Grinding and Lapping Machines • Refractories • Porous Mediums • Non-slip Floors • Norbide Products • Labeling Machines

Discs—You may choose a Norton Disc of exactly the right combination of abrasive, bond, grain, grade and structure to give you fast, cool cut and extra long life on each of your surfacing jobs. They're available in a variety of sizes and with all types of mountings commonly used, including inserted nut and plate mounted.

Cut-off Wheels—NORFLEX Reinforced Resinoid Wheels have replaced conventional resinoid or rubber bonded cut-off wheels on many jobs where wheel breakage has been high. Sprues, gates and risers may be removed from non-ferrous castings quickly and economically with these sturdy, SAFE wheels. Other types of resinoid and rubber bonded wheels are available for cutting higher tensile strength metals and non-metallic materials.

Mounted Wheels and Mounted Points—Excess metal in hard-to-get-at places may be removed quickly and easily with Norton Mounted Wheels and Mounted Points. They're available with fast-cutting 38 ALUNDUM abrasive for jobs on steel and steel alloys, with 37 CRYSTOLON abrasive for jobs on cast iron, chilled iron and non-ferrous metals, and in over 200 standard sizes and shapes.

Rubbing Blocks—CRYSTOLON Rubbing Blocks are popular in foundries everywhere for cleaning off sand, and removing parting lines and other slight projections from gray iron castings. Common grit sizes are 16, 20, and 24—usual grades R and S. The fluted type of block is popular when there are large surfaces to be cleaned.

Contact your Norton abrasive engineer or distributor for helpful information and wheel specifications

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HERE'S AN INSTRUMENT that you can count on day after day for *exact* temperature measurements of non-ferrous pours. Its unique measuring action balances faster than the thermocouple comes to temperature. This cuts immersion time, and thermocouple replacement, to an absolute minimum.

The first industrial instruments that take full advantage of electronic circuits, Dynalog Instruments have fewer moving parts . . . fewer parts to wear or get out of order. Their unique variable air capacitor provides friction-free, completely stepless balancing, unlimited by slidewire turns, unhampered by slidewire troubles. They require practically no maintenance. No knowledge of electronics required. For speed, accuracy, sensitivity and simplicity combined, they have no equal.

Consider the advantages of the Dynalog Concentric Indicator as a means of getting better castings and greater foundry output. Examine the instrument from every angle . . . performance records . . . convenience . . . service-life. Write for complete information now. *The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.*

HIGH VISIBILITY — large, open-face, easy-to-read concentric scale.

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HIGH BALANCING SPEED — only 5 seconds for full scale pointer travel.

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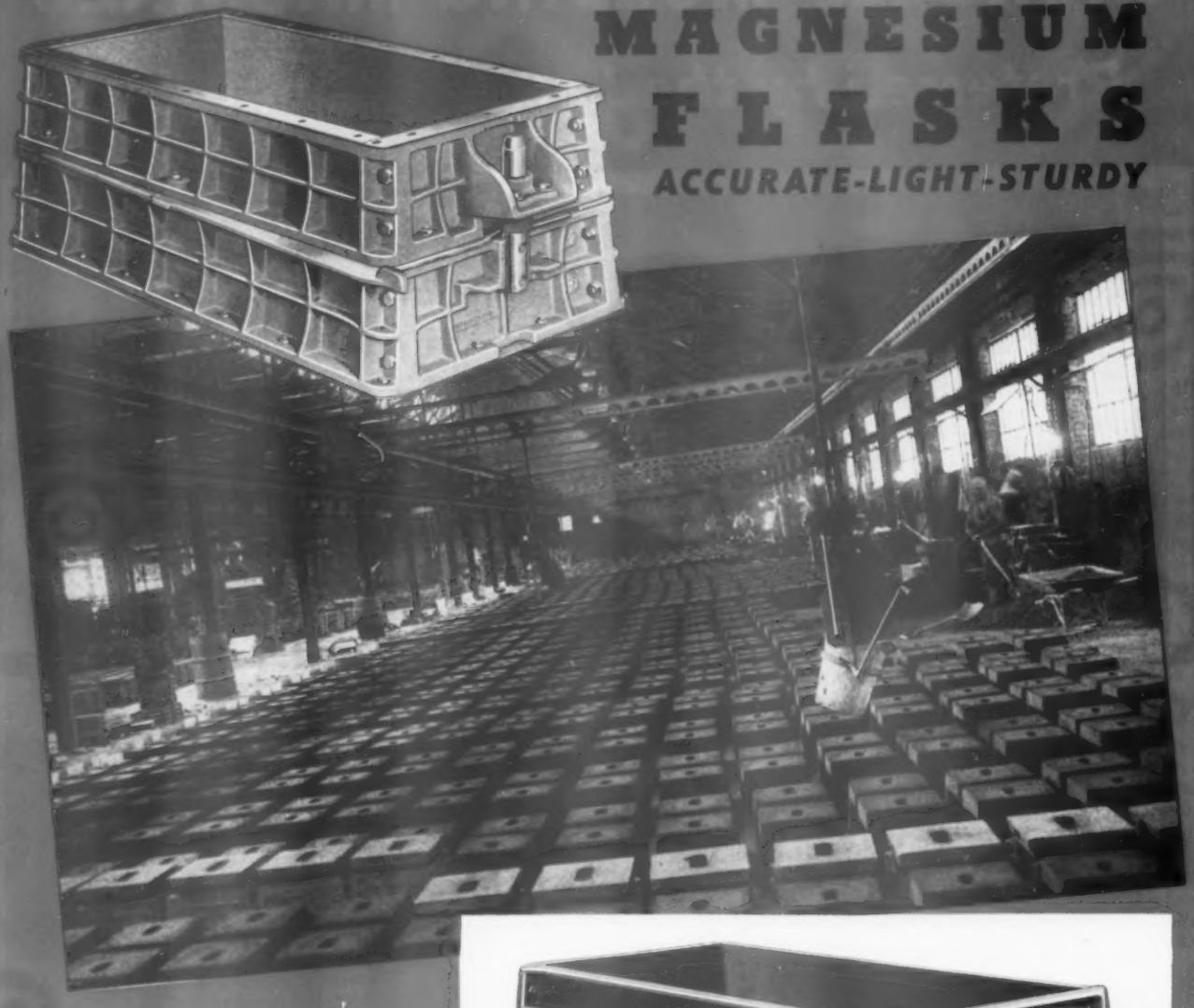
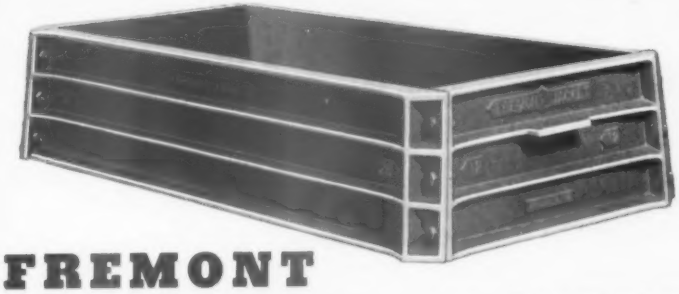
MAGNESIUM FLASKS

ACCURATE-LIGHT-STURDY



All Orders Given Very Prompt Attention



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BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK

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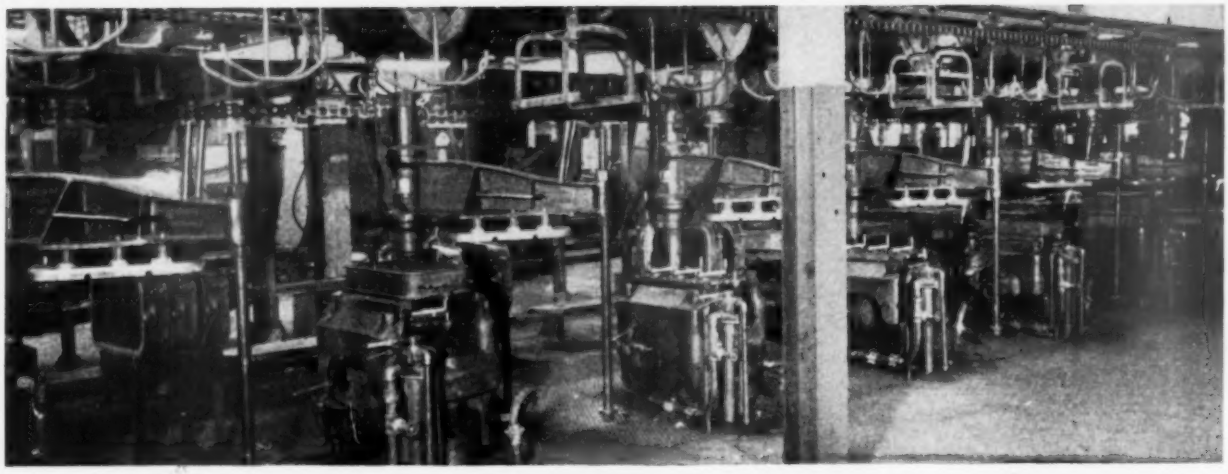
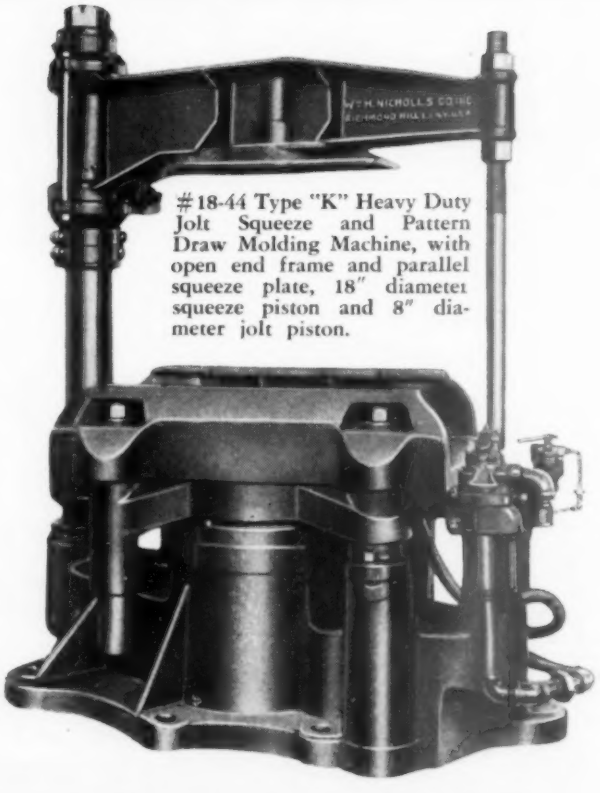
NICHOLLS' MOLDING MACHINES

Preferred by the Largest Foundries!



A BATTERY OF NICHOLLS 16" HEAVY DUTY MACHINES

● REDESIGNED to a minimum of working parts; thereby greatly reducing maintenance cost and, at the same time lowering operating costs through the saving of labor. The crossarm is equipped with a parallel squeeze plate which considerably reduces the amount of crossarm travel; resulting in faster operation and less effort required. The open end frame allows for flexibility in pattern lengths. Quick acting, yet so simple to operate that unskilled labor can be taught to make molds in record time.



#18-44 Type "K" Heavy Duty Jolt Squeeze and Pattern Draw Molding Machine, with open end frame and parallel squeeze plate, 18" diameter squeeze piston and 8" diameter jolt piston.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

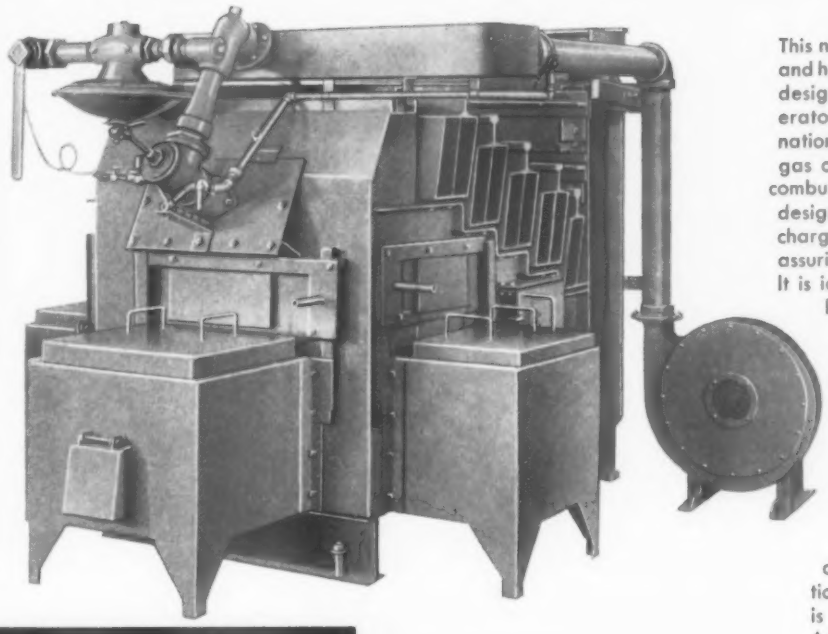
ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EURCPE AND GREAT BRITAIN — GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND

NICHOLLS

ATTENTION ALUMINUM MELTERS!

Here's the NEW Stroman Model MC Aluminum Reverberatory Dip-Out Furnace



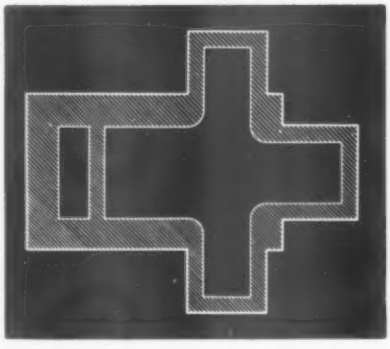
This newest of Stroman Furnaces is a combination of breakdown and holding furnaces. It's two in one... and the most economic ever designed for aluminum melting. The MC Furnace is of the reverberatory type. It can be fired by either gas or oil or with combination burners, so that it is a simple matter to switch from oil to gas or vice-versa. Fuel costs are reduced to unheard of lows, combustion which is generally exhausted in ordinary furnace designs, is used in this furnace to pre-heat and melt the metal charge. No cold metal reaches the bath of molten aluminum, assuring fastest melting and uniform temperature of bath.

It is ideal for Die Casting, Permanent Mold and Sand Casting Plants. It is the zenith of speedy, efficient operation. Hot metal is ALWAYS available for dipping. Built to accommodate 500 to 4000 lbs. metal bath, the dip-out boxes are placed around the furnace so that three to six die casting or permanent mold stations may be easily operated with a single MC Furnace.

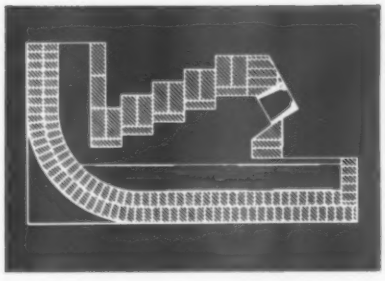
The Model MC brings "Good Housekeeping" to your plant. For returns, gates, risers, may be immediately returned to the hopper with the ingot . . . Creates Ideal Working Conditions, for furnace radiates very little heat . . . Lowest Maintenance, no iron pots or crucibles to replace, no breakdowns . . . Minimum formation of dross . . . Finest quality castings, every time . . . Furnace is delivered as complete unit, ready to melt. Complete Automatic Controls available if desired.

Compare floor space required for one Stroman Model MC to three breakdown and three holding furnaces to supply the same amount of molten metal. A tremendous saving in square feet, as well as man hours and metal saved in transfering from breakdown to holding.

Cut your aluminum melting costs to the bone . . . Let Stroman Engineers show you how this great production furnace will fit into your plant and boost profits to new highs. Write today for full information and specification. Do it NOW.

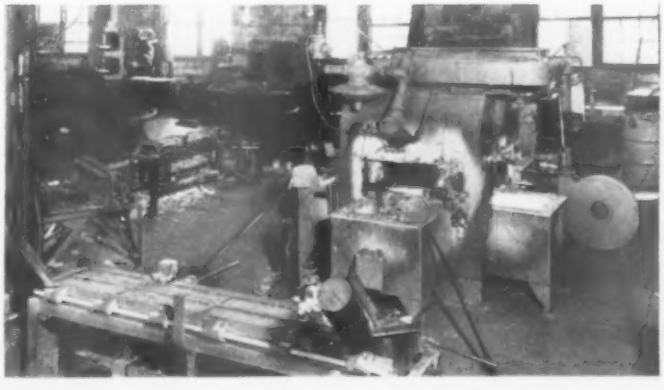


Horizontal View Showing 3 Dip-Out Boxes

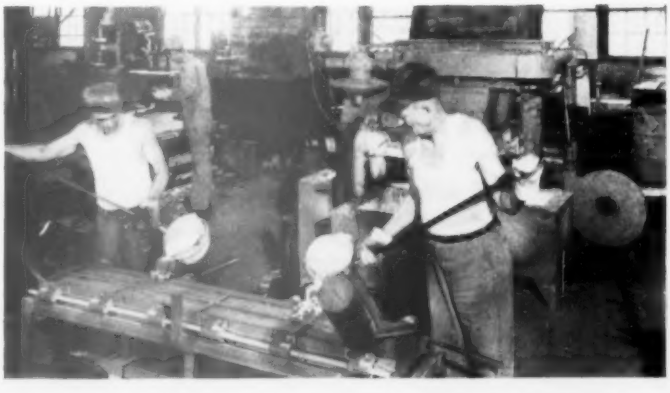


Vertical View Showing Combustion Chamber, Metal Bath and Charging Hopper.

Stroman Model MC Furnace illustrated has a 3000 lb. Metal Bath.



Small floor space still allows up to six men to work with ample elbow room.



STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

The heart of every casting is the pattern...so it has to be "accurate"

The ACCURATE MATCH PLATE COMPANY is a specialized organization with the ability to meet your requirements accurately.

We are foremost in the manufacture of pressure cast match plates, both as to quality and quantity.

Our plant is a modern building, housing specialized equipment and highly skilled artisans under able supervision.

We manufacture the following types of PRESSURE CAST EQUIPMENT from Plaster Molds:

Aluminum MATCH PLATES, COPE AND DRAG SETS,
CORE BOX CASTINGS, and white metal and aluminum
PATTERN CASTINGS.

Aluminum cast under pressure in plaster molds insures accurate dimensions, adherence to detail and smooth surfaces.

DESCRIPTIVE BROCHURE UPON REQUEST

QUICK DELIVERY BY RAIL EXPRESS OR AIR FREIGHT

Pick-up and delivery by jobber representatives in the following areas:

MILWAUKEE, WIS.
John M. Donohue
Bluemound 8-8989

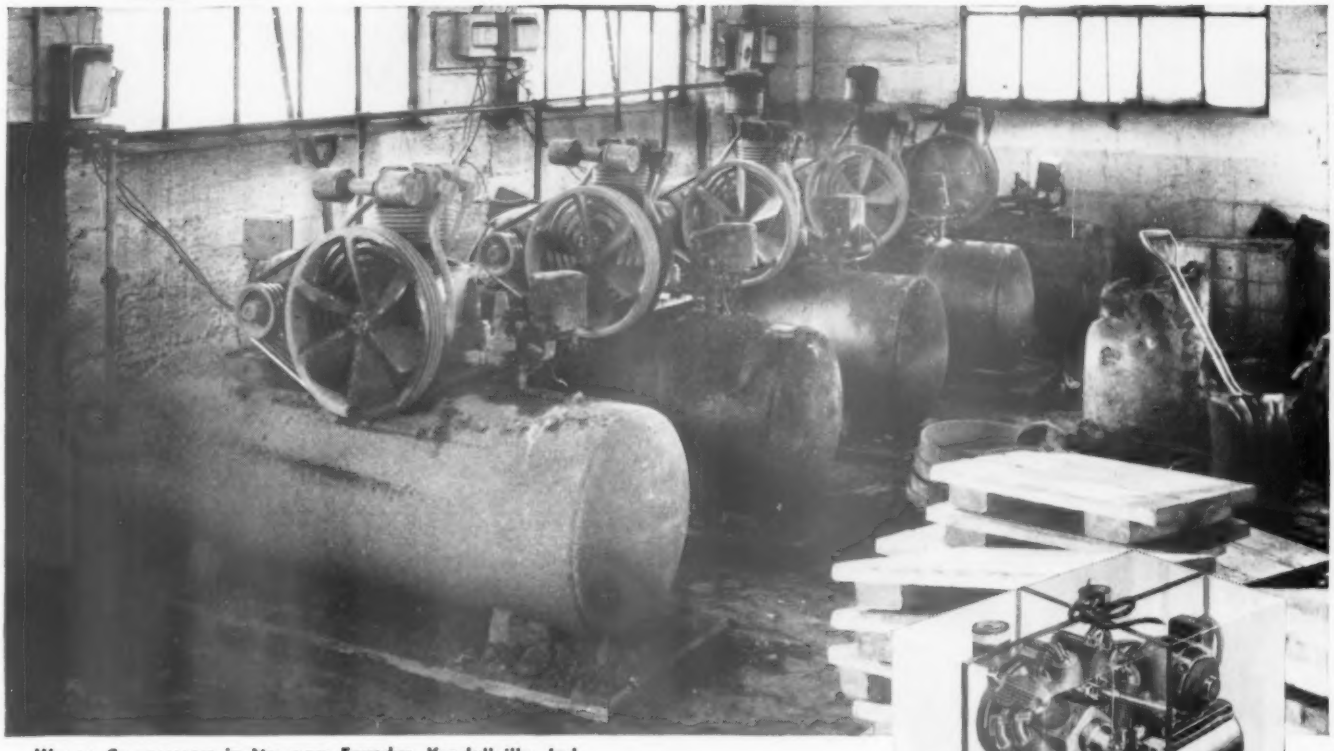
WORCESTER, MASS.
Henry A. Kottmann
Auburn 2683

LOS ANGELES, CAL.
McGowan Company, Inc.
TRinity 2057

NORMAL, ILL.
Clarence C. Schmidlin
Normal 8743-1

ACCURATE MATCH PLATE COMPANY
1847-51 W. CARROLL AVE., CHICAGO 12, ILL.
TELEPHONES: SEeley 2-7918, 2-7919

"NEVER WITHOUT AIR"



Wayne Compressors in Newnam Foundry, Kendallville, Ind.

Decentralize

AIR SUPPLY FOR SAFETY

WAYNE AIR Compressors are proving their reliability and stamina in foundries everywhere. The Newnam Foundry has fifteen Waynes manifolded in banks to care for different departments so that jolt squeezers and core blowers are never without air even if one unit should fail. Inexpensive units are kept on hand for needed replacements.

Some of these units have been operating in this plant under rugged conditions for ten years and the maintenance problem has been negligible. Most important of all . . . they have never lost production for lack of air. Investigate the Wayne Auxiliary Unit Plan now. It offers many other money-saving advantages. Use the coupon.

WAYNE NATIONWIDE SERVICE

Investigate

THE WAYNE AUXILIARY UNIT PLAN!

THE WAYNE PUMP COMPANY · FORT WAYNE 4, INDIANA
523 Tecumseh Street

Please tell us more about Wayne Air Compressors and send booklet, "The Wayne Auxiliary Unit Plan." No obligation.

NAME _____ ADDRESS _____

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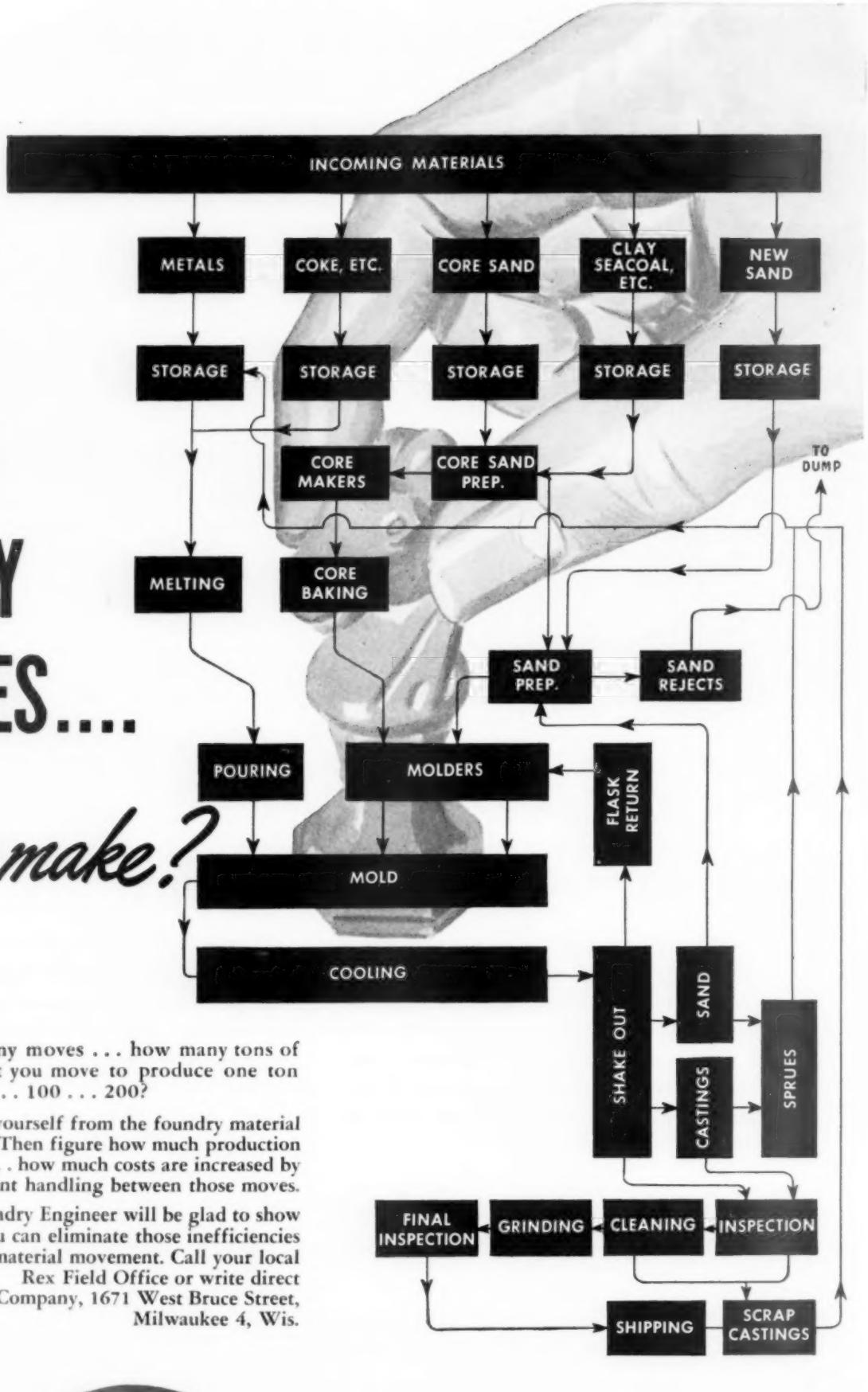
HOISTS • LOADING DOCK LIFTS • HOSE REELS • POWER WASHERS

HOW MANY MOVES.... *do you make?*



How many moves . . . how many tons of materials must you move to produce one ton of castings—50 . . . 100 . . . 200?

Figure it out yourself from the foundry material flow chart above. Then figure how much production is lost . . . how much costs are increased by inefficient handling between those moves.

A Rex Foundry Engineer will be glad to show you how you can eliminate those inefficiencies in your material movement. Call your local Rex Field Office or write direct to Chain Belt Company, 1671 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

FOUNDRY HANDLING SYSTEMS

HERE'S HOW...

Roe F. Reed, President, Reed Metal Crafts and prominent in die casting circles says: "We're more than satisfied with our Lindberg-Fisher melting furnace. We've ordered another, and plan to install more in the future".

Ask for reprint of magazine article "Two-Chamber Induction Melting Furnace Lowers Aluminum Die Casting Cost".

★ Casting rejects are reduced 43% . . .
★ Production Increased 22% . . .
★ Per Unit Labor Cost cut 24% . . .
at Reed Metal Crafts, Chicago

A Lindberg-Fisher 2-chamber induction melting furnace was recently installed by this well known Chicago custom die casting plant. They report reduced rejects and increased production because . . .

. . . **there is no alloy segregation** and thus no rejects due to machining difficulty resulting from segregate-inclusions. Alloys are *kept* in solution and effectiveness of alloy content is *not* lost.

. . . **molten aluminum temperature uniformity is held to plus or minus 5°F.** Castings can be shot at lower temperatures because there is no need to allow for furnace over-and undershooting. Lower casting temperature permits more shots per hour—increases production—reduces rejects.

. . . **ladling is continuous.** Ingot or scrap is charged into *separate* chamber—melts and flows into ladling chamber. No lost stand-by time while aluminum melts.

. . . **only metal is heated,** not the entire furnace. Reduced heat radiation from furnace shell lowers temperature 20°–25° F. at operator's station—improves working conditions.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 West Hubbard Street, Chicago 12, Illinois

The four new Sterling folders are now at the printers. Send for yours today.

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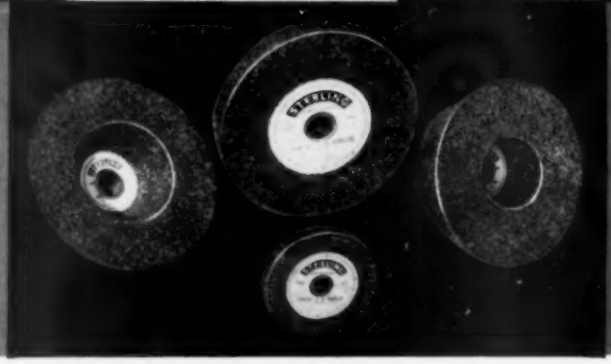
WHERE YOUR G
AND PERFECTION A

"THE WHEELS OF INDUSTRY"
STERLING
GRINDING WHEELS



AN EXAMPLE OF STERLING'S PRODUCT DEVELOPMENT TECHNIQUE

In the view above, Sterling technicians are mixing and weighing the bond and grain to be absolutely certain it meets the requirements of your special wheel formula.

The Sterling Portable Wheels, shown to the left, are but one example of many different types from which better results can be obtained . . . thanks to Sterling research.

RLING

GRINDING WHEEL'S PERFORMANCE ARE MEASURED IN GRAMS . . . . .

THE fine line of quality can never be drawn too thin. That is why Sterling automatically measures the bond and grain for your "Wheels of Industry" in specially designed equipment and weighs it to fraction-of-a-gram accuracy.

The interest in your grinding welfare indicated by this accurate, controlled mixing of your grinding wheel's ingredients is matched by every other Sterling manufacturing operation. It is in keeping with the exacting requirements of Sterling's New Research and Development Program which, after years of planning, is now available to you.

Conceived as a new idea in cooperation between manufacturer and customer, Sterling's New Research and Development Program offers faster, more detailed study of your grinding problems than has ever before been possible. Through its application, your special problems are studied by Sterling engineers and solved by Sterling Grinding Wheels, built to your particular needs. A letter from you will bring full explanation. May we serve you?

Sterling Research and Development in Action

FIRST STEP . . . The call of the Sterling engineer on your operator involves no obligation, but always starts an investigation which results in faster, better production.

SECOND STEP . The Sterling engineer's study of your problem is a "shirt sleeve" proposition. Here, his practical experience on hundreds of grinding jobs means a lot

THIRD STEP . Back at Sterling, the combined knowledge of a committee of grinding experts is applied to the engineer's recommendation

FOURTH STEP . The better performance of the new Sterling Grinding Wheel on your machine, reflects the wisdom of securing the advice of Sterling's technicians.

THE STERLING GRINDING WHEEL DIVISION

of

THE CLEVELAND QUARRIES CO.

TIFFIN, OHIO

Since 1885, Manufacturers of "The Wheels of Industry"

Use CASTFLUX TRADE MARK REG.

THE "NATIONAL" DUAL PURPOSE FLUX *for Both...*

Get FLUIDITY

- Closer Grained Castings
- Fewer Rejects
- Fewer Miss Runs
- Less Remelting
- Longer Ladle Life
- Less Ladle Chipping

at a cost of 10¢ to 15¢
per ton of metal treated.

1 IN THE LADLE

CASTFLUX TRADE MARK REG.

2 ON BOTH OPEN AND BLIND RISERS

IN THE LADLE...

CASTFLUX increases Fluidity materially by cleansing and purifying the metal bringing to the surface occluded oxides, gases, slag, dirt, and other foreign matter, offsetting the negative factors of inferior scrap and coke.

•

ON BOTH BLIND AND OPEN RISERS...

CASTFLUX raises the temperature of the metal to a higher degree and substantially increases and maintains the fluidity of the metal during the entire cooling-down period.

UNCONDITIONALLY GUARANTEED

Unless Castflux meets with your full approval material can be returned, providing we are notified within 30 days after receipt of material.

Give Castflux a trial in your plant. You'll be highly gratified with the results. Write for prices, complete data.

NATIONAL PIGMENT COMPANY
2115-2117 EAST YORK STREET
PHILADELPHIA 25, PENNA.

How to cut costs with the NEW ROTOR *360* CYCLE TOOLS

THE new Rotor 360 Cycle Tools develop nearly twice the power of 180 cycle tools with the same size motor and develop *more power per pound* than any other type of portable tool.

The 6-inch, 360 Cycle Rotor Grinder shown weighs only 12½ lbs., operates at free speed of 6000 R.P.M. and under full load at 5700 R.P.M. This light weight and high speed under load means *greater production . . . lower costs.*

Call the Rotor Analyst for full information on this remarkable new line of Rotor grinders, sanders, buffers and polishers. Write for free copy of Bulletin 36.

360 CYCLE O'TOOL

Tailor - made

YOU!

• Just as a tailor-made suit is custom-fitted to the lines of your figure, so too are Thiem core washes and mold coatings *tailor-made* to your individual foundry requirements. Thiem technicians realize that foundry practices differ greatly — that a product which is perfectly suited to one foundry operation may not be nearly as effective in another. Because of these differences, Thiem products are literally *custom-fitted* to your way of doing things. The result is quality products that cut costs, speed operations and eliminate mixing errors.

THIEM

Specify Thiem products for your core wash and mold coating problems. Remember — all Thiem products are laboratory controlled, sold with service — *and tailor-made for you!*

Thiem

PRODUCTS, INC., MILWAUKEE 14, WISCONSIN

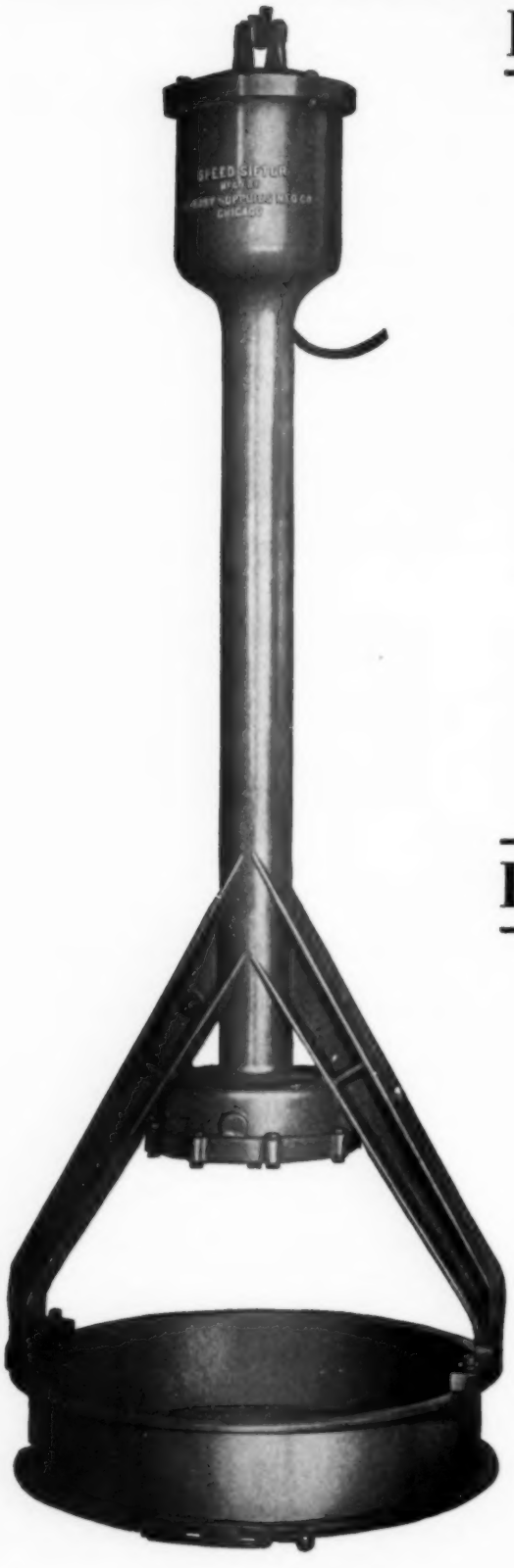
Manufacturers of Foundry Products Exclusively

KROME KOTE • FERRO KOTE • MOLD LITE • INGOT KOTE • NODRI MOLD SPRAY • FERRO-GLAZE FLUX • CHILL KOTE • SYNOL • CORE-BINDERS

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

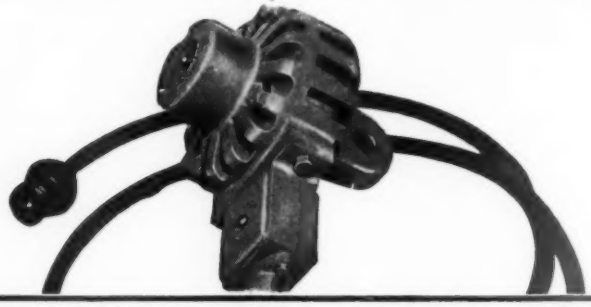
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $225.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators: Single pole $5.00, Double pole $6.50.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

This seven-car accident jammed traffic on New York's West Side Highway when a motorist stopped to read a sign!

Shortages, and a hundred and one other problems confront the steel industry as it continues to meet the increasing demands of industry, commerce, and transportation.

We all get into a jam occasionally and are not able to keep everyone satisfied all the time. But you can be assured that we are doing our best to maintain our record of satisfactory performance.

FERRO-SILICON 50 - 75 - 85%

H. C. FERRO-CHROME · FERRO-MANGANESE

SIMANAL · BOROSIL

BRIQUETS

SILICON · MANGANESE · CHROME

SILICO-MANGANESE

PHILO RAINIER

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Ohio Ferro-Alloys Corporation

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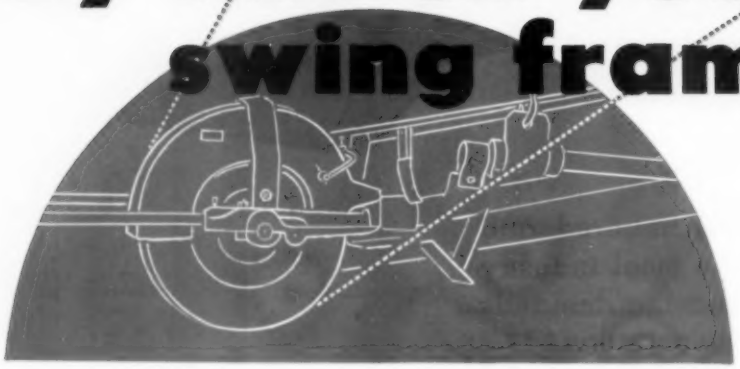
Chicago Detroit Pittsburgh San Francisco Tacoma

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

Grinding Wheels

Try this on your swing frame grinder

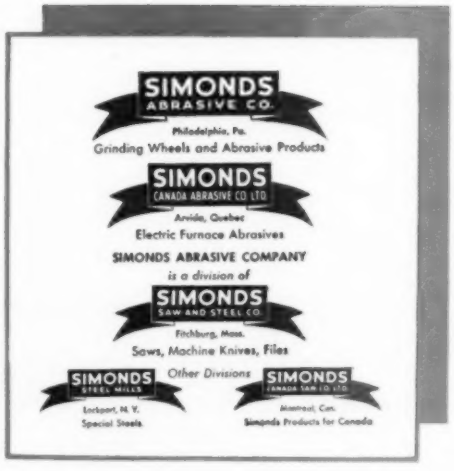


For less machine wear. **Red Streak Flanges, an exclusive patented feature of this Simonds Abrasive Co. resinoid bonded snagging wheel, give better spindle fit (steel against steel) and reduce abrasive wear on machine parts.**

For better wheel action. **Mount center and flanges keep accurate for truer running, better balance and long lasting efficiency on production work.**

For economical results. **On the basis of wheel cost, life, stock removal, labor cost and overhead. Performance proved by actual tests!**

For top performance, low cost use Simonds Abrasive Wheels. Send for new Snagging Bulletin, Form ESA-62 for detailed information. Write now.

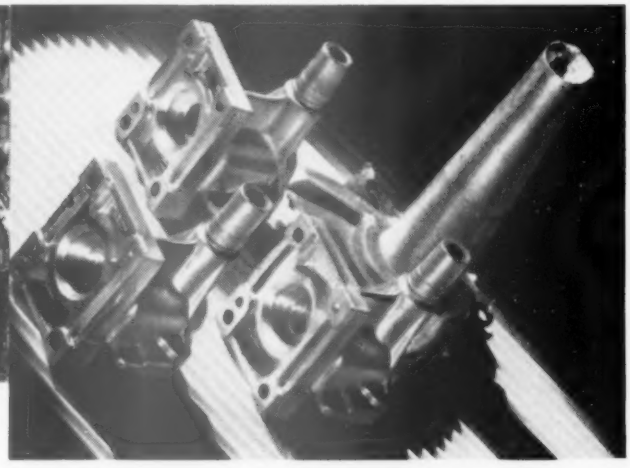


SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

If you're considering new die casting machinery...

why not profit from the experience of others?

One of a battery of 5 Model 400 Clevelands in operation in the modern plant of the St. Louis Die Casting Corp., St. Louis, Mo. The operator is removing the casting shown at right.



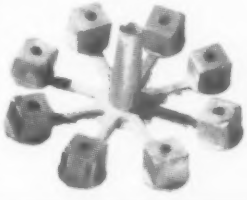
ST. LOUIS DIE CASTING CORP. *gets better castings, faster, at less cost* WITH CLEVELAND MODEL 400's

These three examples are typical of the production —*around the clock*—that experienced die casters are getting from Cleveland Die Casting Machines. You too can get better castings, faster, at less cost, with Clevelands.

Let a Cleveland engineer show you *further proof* of the advantages these machines can bring to your die casting production. For complete information on machine specifications, write now for bulletins.

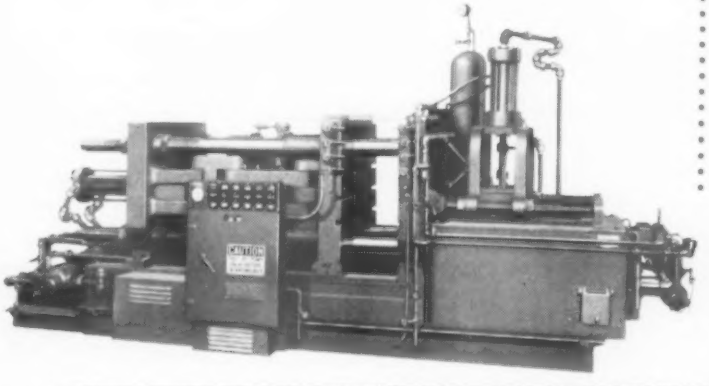
340 SHOTS PER HOUR!
Weight of metal per shot 14.35 oz. Weight per piece 4.6 oz.

Zinc fan gear case casting from two-cavity die with movable cores. Most of the cored holes required no further finishing. Three critical dimensions are held to ± .001" tolerance. Each casting receives a careful spot check, and at time photo was taken, 170,000 castings had been produced without a single reject.



325 SHOTS PER HOUR!
Weight of metal per shot 3.3 lbs. Weight per piece 4.75 oz. Zinc nuts cast from 8-cavity die.

375 SHOTS PER HOUR!
Weight of metal per shot 1.15 lbs. Weight per piece 1.8 oz. Zinc nobs for electric control panel cast from 6-cavity die.



Cleveland Model 400 Universal High-Pressure Hydraulic Die Casting Machine for zinc, tin or lead. Hot metal end can be easily changed to convert to cold chamber machine. 36" x 38" die plates. Approx. 800,000 lbs. locking pressure.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4926 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

DEMMLER Core Blower NO. 55

A FAST CORE BLOWER EVERY FOUNDRY NEEDS AND CAN AFFORD

Because of its many features, the new Demmler No. 55 Core Blower was quick to gain popularity with foundrymen everywhere. This versatile machine will accommodate boxes 9 inches long—handle cores weighing up to 3 pounds. Sand magazine opening is 4½ by 9½ inches. A single hand valve operates both vertical and horizontal core box clamps and blows the core. Only 3 seconds required for complete cycle!

IDEAL FOR SHORT RUN JOBS

Among the many high quality features found on the new DEMMLER No. 55 are:

1. **Quick, easy adjustments for raising the table and moving chuck jaws.**
2. **Sliding, quick change blow plates**
3. **Trouble-free diaphragm type blow valve**
4. **Sand magazine and carriage of aluminum castings, with ball bearing rollers**

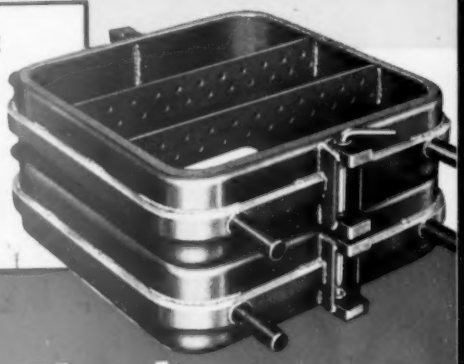
Very reasonable in price, the DEMMLER No. 55 is the economical solution to the rapid production of high quality small cores—an ideal machine for any foundry whether large or small.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

SEND FOR ILLUSTRATED SPECIFICATION SHEET

Are You STUBBORN *About the Quality of Your* FOUNDRY FLASKS?



Here's Why

BS&B Welded Steel Flasks Will Do Your Job Better

FOUNDRY MEN make Black, Sivalls & Bryson Foundry Flasks. They know that flasks are precision tools . . . and must be made by precision methods. When you use B S & B Welded Steel Flasks, you get the advantages of:

LONG, UNBROKEN EXPERIENCE in flask manufacture. BS&B originated the welded steel flask. BS&B pioneered the steel-bushed flask. Such leadership means better service for you!

SKILLED CRAFTSMEN, MODERN MACHINERY that carry out your specifications with meticulous care. Welding, grinding, pin lug drilling . . . every step is accomplished by experts in the huge BS&B plant.

GREATER STRENGTH, properly distributed, insures dependable service under the most rugged conditions. BS&B Flasks are famous for their long life.

LESS WEIGHT means greater output in less time. BS&B Flasks are easier to handle, are a reliable aid in saving sand and preventing re-runs.

Any shape, any size flask for any purpose, with any combination of fittings . . . built to your order by men who know the foundry! See your nearest BS&B distributor, or write for full information.

BLACK, SIVALLS & BRYSON, INC.

Special Products Division

Power and Light Building **Kansas City 6, Mo.**

AUTHORIZED BS&B DISTRIBUTOR

ORDER TODAY! RAPID DELIVERY

Distributors the Nation Over Are Ready to Serve You

BIRMINGHAM, ALA.
Foundry Service Co.

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CINCINNATI, O.
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EDWARDSVILLE, ILL.
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TORONTO, CAN.
Canadian Foundry Sup. & Equip., Ltd.

NORTH AMERICAN
OILTOGAS *Converter**

MAKES IT POSSIBLE
to burn No. 1, 2, or 3 Fuel Oil as a Gas in your present Gas Burners

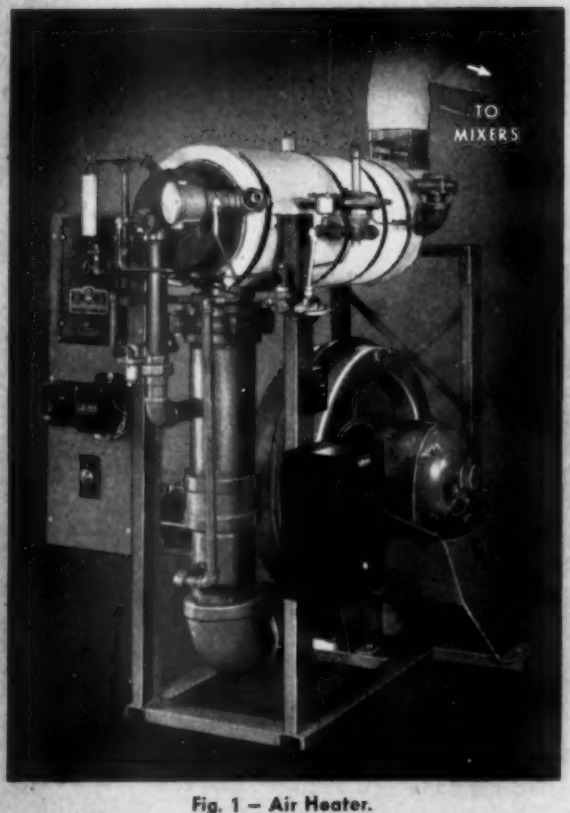

Fig. 1 – Air Heater.

AVOID CRITICAL GAS SHORTAGES

Many industrial ovens, furnaces and boilers are fired with gas burners which do not lend themselves to the substitution of direct oil burners during the trying days of gas curtailments. For such applications North American offers the Oiltogas Converter.

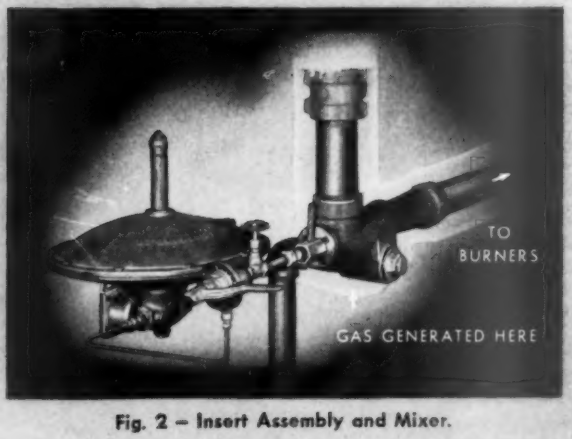

Fig. 2 – Insert Assembly and Mixer.

PRODUCES CLEAN CARBON-FREE GAS FIRES

The principle of the Oiltogas Converter is to supply air at 700°F. to standard North American Aspirator (Gas-Air) Mixers. Into the mixer (through the displacement rod) is injected atomized oil. The hot air immediately vaporizes all of the finely atomized oil and carries the gaseous fuel thus generated to any number of burners.

The air heater shown in Figure 1 is direct oil-fired and is entirely automatic in operation and includes flame safety devices. The amount of fire at the furnace or oven burners is controlled by valves in the hot air line leading to the mixers.

Because of the high air temperatures used and the excellent atomization of the fuel, it is found that even on #3 catalytic fuel oil no carbon or condensate is formed in the piping or burner manifolds. This eliminates the necessity for installing condensate return piping and for periodic cleaning.

***A combination of Standard Combustion Equipment, backed by 30 years of Dependable Service**

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES with FIELD ENGINEERS in PRINCIPAL CITIES

CLEVELAND 5, OHIO

Now...

AO FOUNDRY GOGGLE
in 2 Sizes

Here's the COMFORTABLE answer to high impact hazards encountered in foundry operations. The AO NFA Foundry Goggle is now available in two sizes — the "305" for large faces, the "307" to fit smaller faces. For extra comfort and tight fit, both are supplied with a corduroy binding around the entire edge of the soft horsehide leather mask. Rubber headband is easily, quickly adjustable. Wire screen ventilators provide EXTRA LARGE AREA OF VENTILATION, minimize fogging and keep sparks and flying objects OUT! Recommended highly for hazards met with in pouring, melting, chipping, grinding, babbitting, riveting, hand tool and machine work. Your nearest AO Safety Representative can supply the 305 and 307 with 50 mm. Super Armorplate clear lenses or Calobar lenses in three shades.

Safety Division of American Optical COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

"It's a rugged and powerful piece of equipment"

. . . says Russell Dunham, *Foreman*, WHITING CORPORATION, *Harvey, Ill.*

The BELL Prime Mover*

The Bell Prime Mover, combining the functions of giant motorized wheelbarrow, 14-square-foot industrial truck, and sturdy snow plow, has earned the respect and endorsement of foundrymen throughout the country. Here is what Mr. Dunham wrote . . .

". . . it will handle a load of 1000 pounds easily, and will crawl through loose sand on the foundry floor where no other wheelbarrow could be pushed. It carries in one load the amount ordinarily carried in three hand-operated wheelbarrows."

Not only do Bell Prime Movers save time and labor for the Whiting Corp. in the movement of sand, they are also used for hauling lumber, bags of silicon, castings, and concrete.

Scores of examples like this can be cited about Prime Mover efficiency and over-all savings on foundry work. But the most convincing evidence of all is a demonstration in your own plant. We would like to arrange such a demonstration for you with one of our many sales and service organizations. If you are interested in cutting the cost of moving sand and other materials in your foundry, please sign and attach this coupon to your letterhead and mail it to us.

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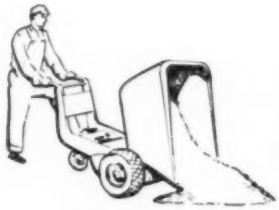
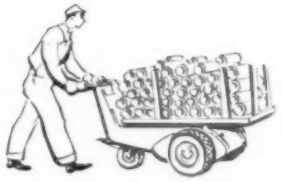
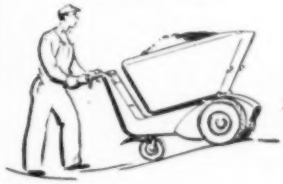
Bucket holds 10 cubic feet . . . 18 with sideboards



Mechanically dumped . . . operates by foot pedal

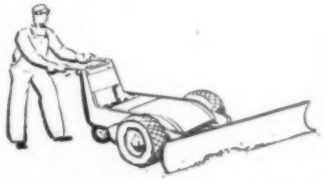


9- or 14- square-foot steel platform takes half-ton loads



Climbs 20% grades fully loaded

50-inch steel blade makes Prime Mover an efficient snow plow



- Gear driven . . . no belts or chains.
- Fully enclosed engine protected against dirt and moisture.
- Clutch, engine, transmission all run in oil.
- Switch from bucket to platform without tools . . . in less than a minute.
- Turns in its own length (63½"); width 31½".
- 3-gallon tankful of fuel gives 8 hours continuous service.

A PRODUCT OF BELL *Aircraft* CORPORATION

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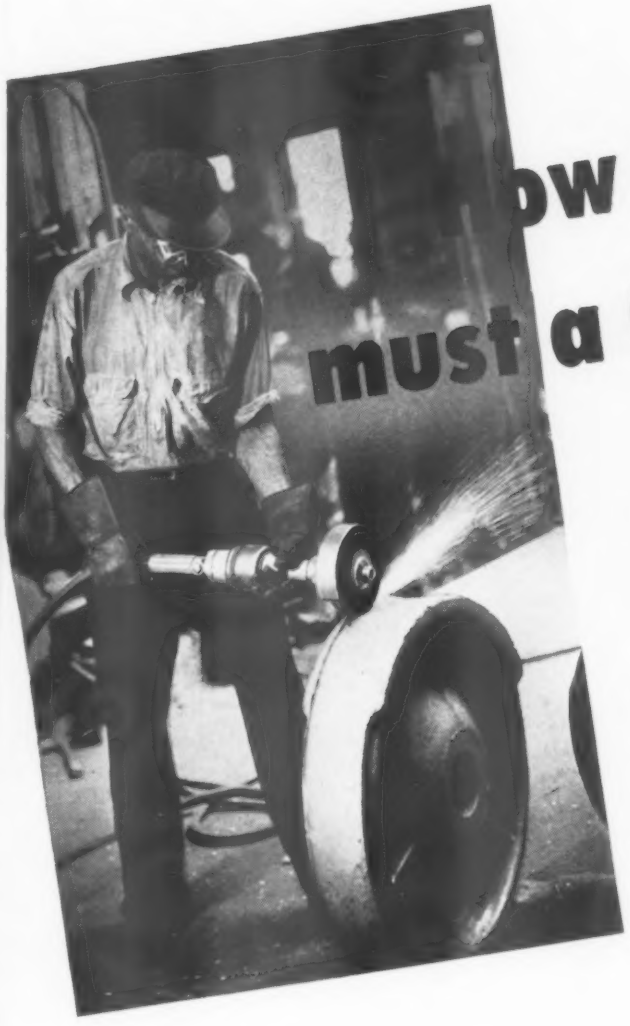

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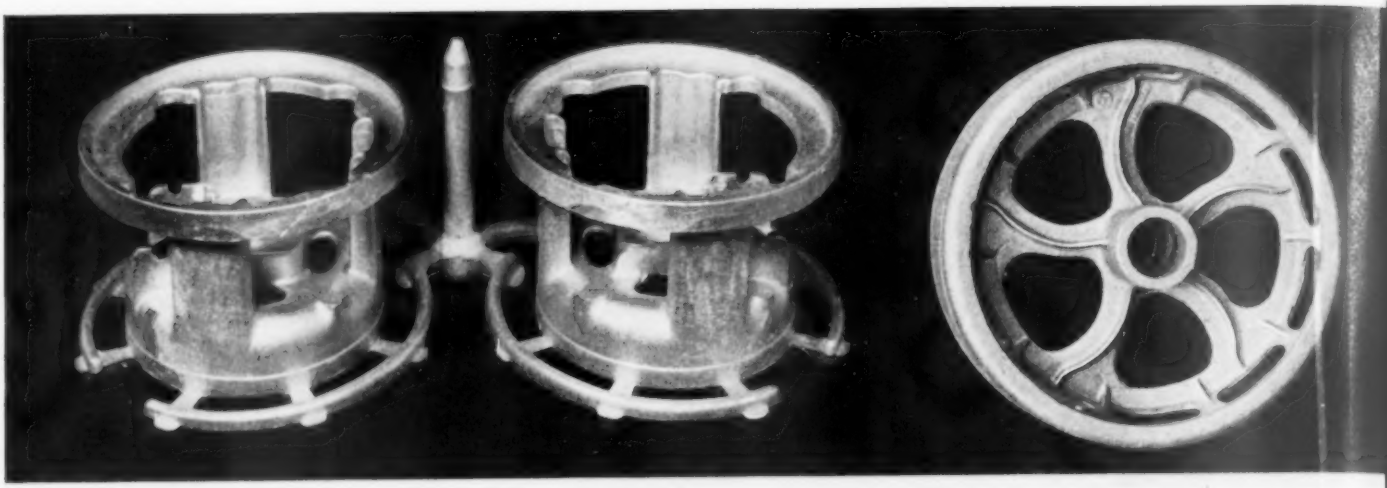

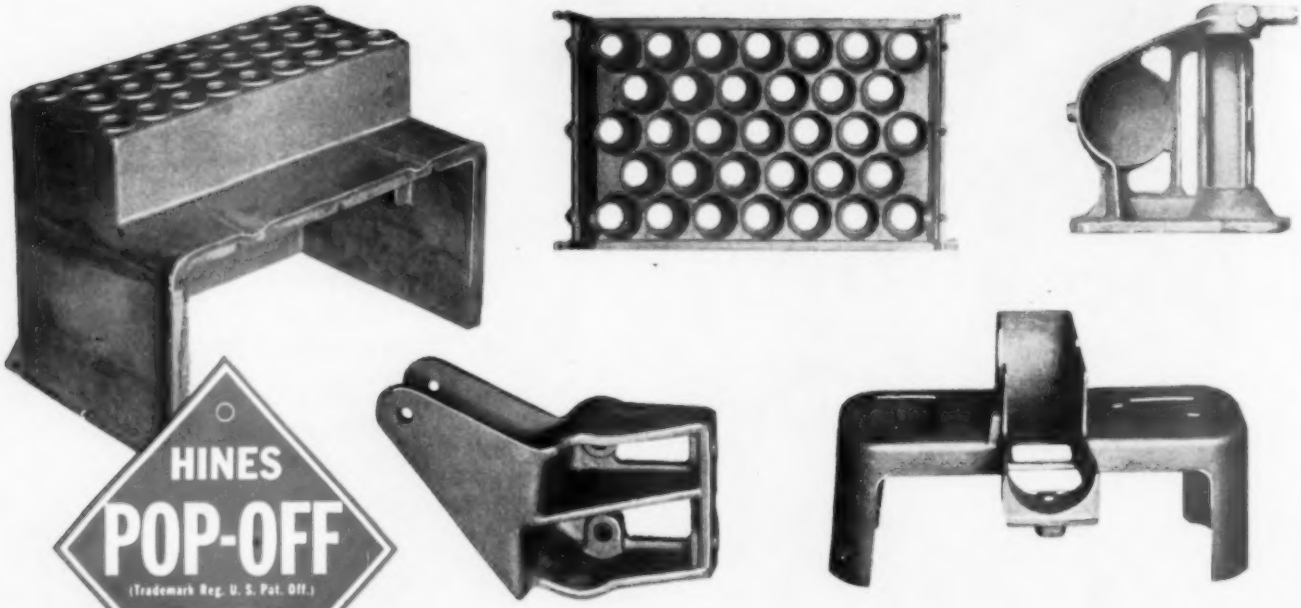

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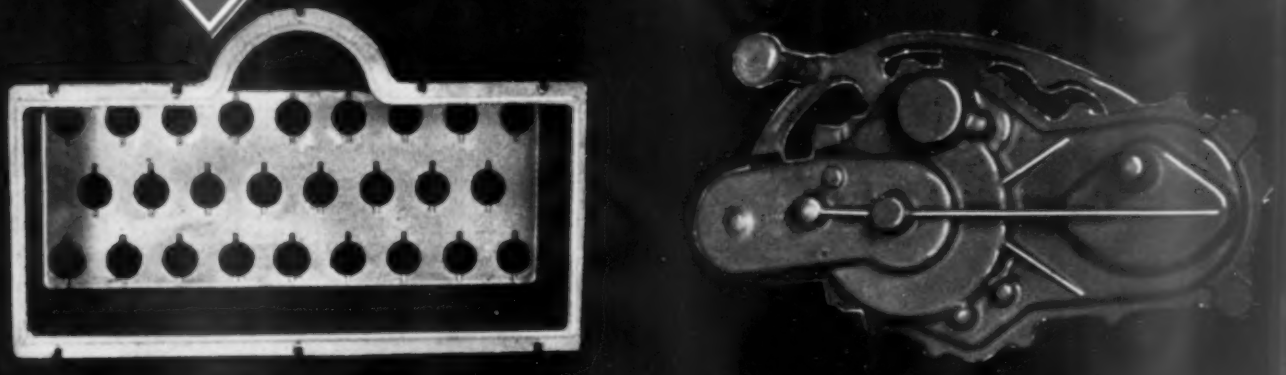

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The Well Designed Industrial Oven

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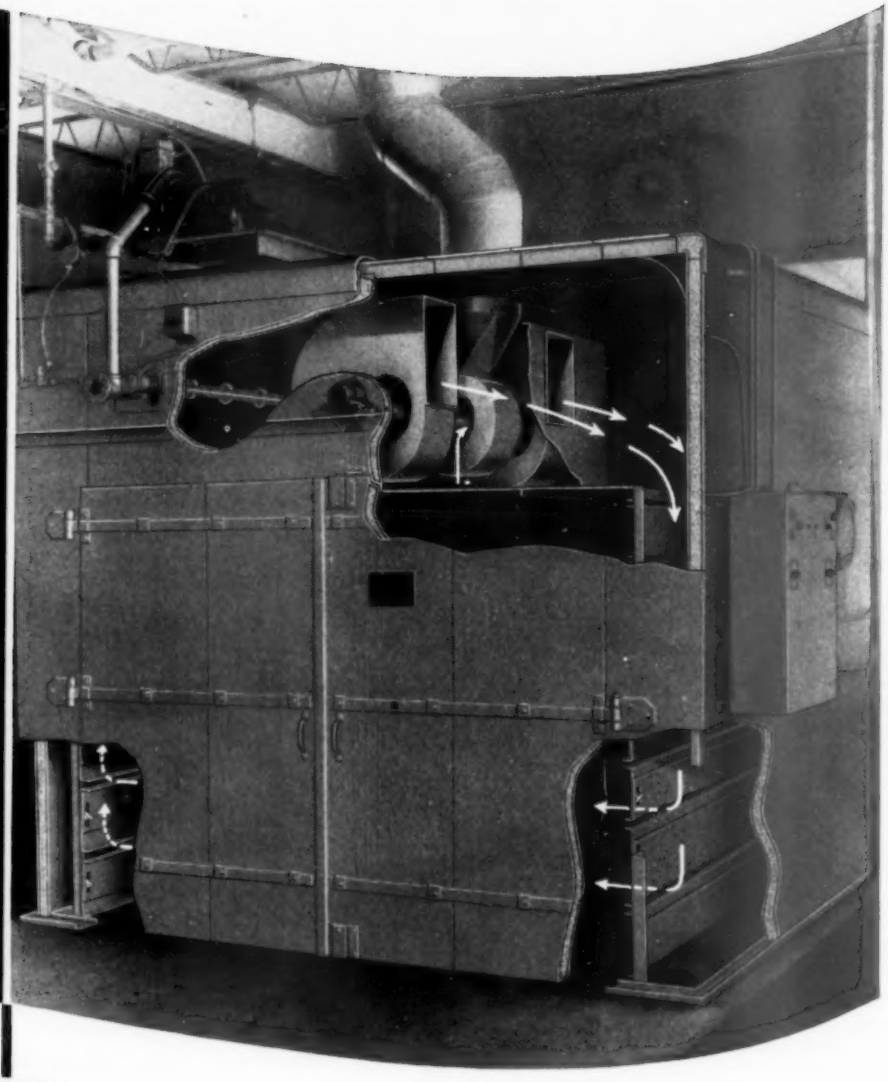

This batch type oven used equally well for core, insulation, paint and grinding wheel baking—also low temperature heat treating, plastic curing and other processes, is a compact, self-contained unit. Recirculating heaters and exhaust fans are integral parts of the oven assembly for maximum heat conservation, greatest economy of plant space and better appearance. Note they are entirely within the oven frame.

Although gas heating is illustrated here, any other type of heating is equally applicable.

A single drive motor operates both recirculating and exhaust fans for maximum power saving.

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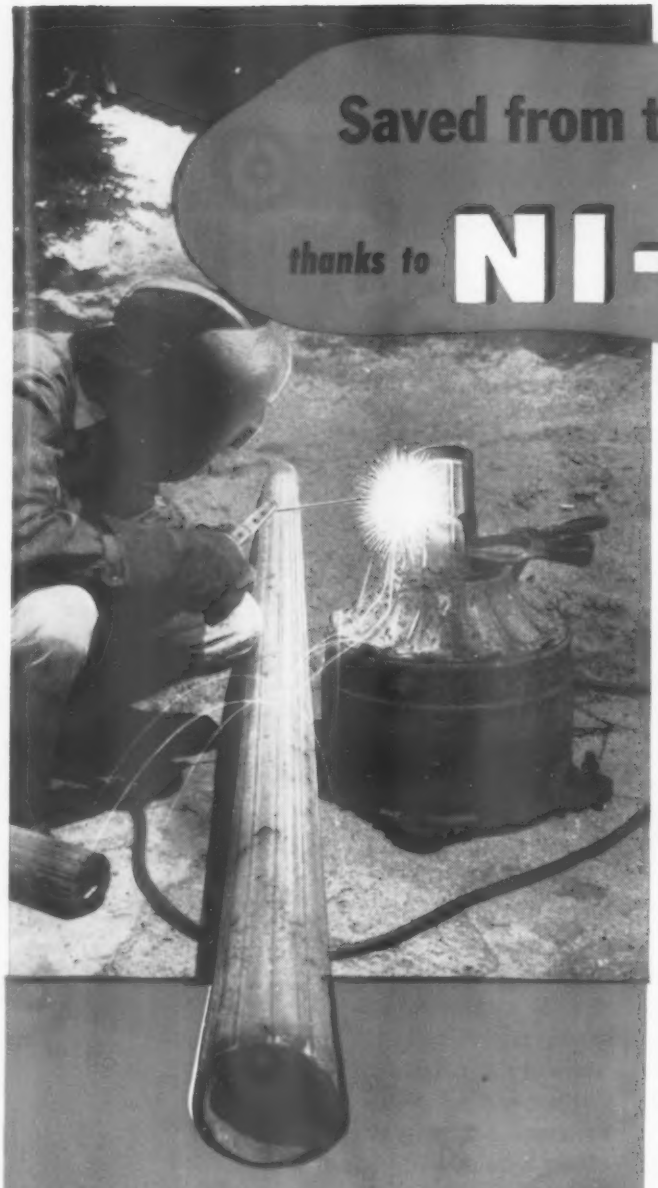
Saved from the scrap heap...

thanks to NI-ROD



Repairing a 250-pound cast iron lamp post with 1/8" NI-ROD Electrode. The General Welding Service, Elmhurst, L. I., N. Y. find that NI-ROD gives the best results of any electrode they have tried in this service. NI-ROD gives such smooth bead contour that it is not necessary to grind welds flush. A new coat of paint completes the repair.

IT HURTS to scrap a casting. There's the lost time, delayed order, irate customer . . . and the plain cussedness of having to do a job over.

Well, here's some good news! Foundries all over the country are saving defective castings from the scrap heap with NI-ROD*, Inco's easy-to-use electrode for cast iron welding.

NI-ROD can't be beat for cast iron repairs because it needs no coddling...seldom requires preheating or post-heating...gives stable arc on AC or DC...and makes sound, *machinable* welds.

Typical example of NI-ROD's on-the-spot usefulness was the *Case of the Irreplaceable Lamp Post.*

A motorist, whose daring exceeded his skill, demolished a lamp post in Forest Hills Gardens, Long Island, N. Y. This was no ordinary lamp post. It was a work of art in cast and wrought iron, virtually irreplaceable, so repaired it *had* to be.

Mr. Patrick O'Brien, superintendent of the Forest Hills Gardens development, sent a call for help to Messrs. Thompson and Shannon of General Welding Service, Elmhurst, L. I. They arrived on the scene equipped with mobile welding generator and NI-ROD. Result? In short order, the precious lamp post was back on its feet, practically as good as new.

Lamp post mayhem is a fairly common occurrence in his bailiwick, reports Mr. O'Brien. But thanks to NI-ROD and the skill of General Welding Service technicians, the aristocratic lighting fixtures are being preserved.

In addition to its usefulness in all-around cast iron maintenance work, NI-ROD gives excellent results in repairing close-tolerance castings. NI-ROD minimizes the danger of warpage, and original dimensions can be preserved.

NI-ROD comes in 3/32", 1/8", 5/32" and 3/16" diameters. Order a five-pound package from your distributor—and see for yourself how NI-ROD takes the "fight" out of welding cast iron. *Reg. U. S. Pat. Off.

Free—*new welding booklet: "NI-ROD... a new electrode for all cast iron welding."*

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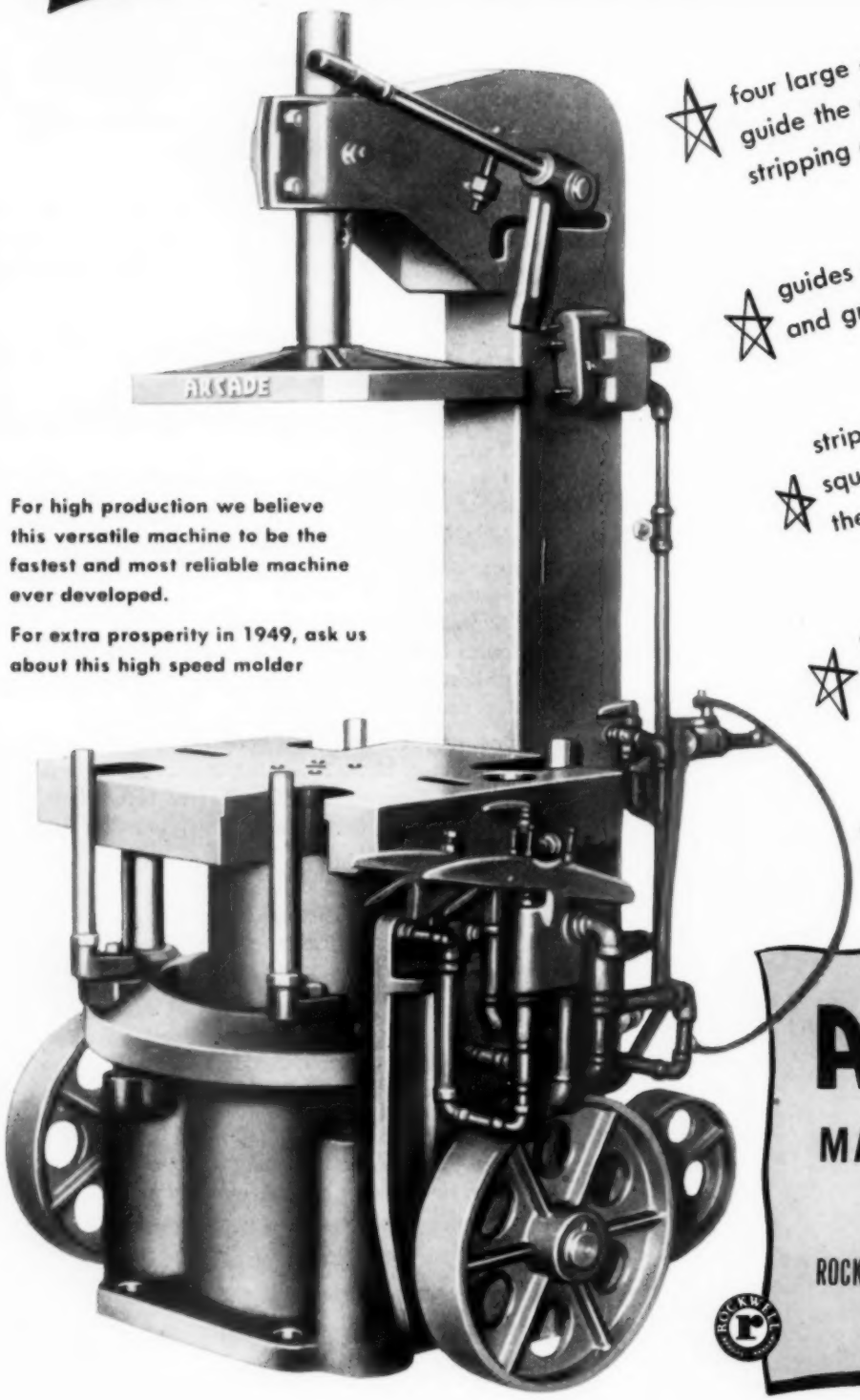

- four large guide pins to guide the pattern draw or stripping operation
- guides and bushings hardened and ground
- strips on the exhaust stroke of the squeeze or will push off after the squeeze
- serves as a jolt squeeze stripper, a jolt squeeze, pin push off, or as a plain jolt squeezer
- heavy, exceedingly rugged – all sizes

For high production we believe this versatile machine to be the fastest and most reliable machine ever developed.

For extra prosperity in 1949, ask us about this high speed molder

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Bill

Marks 30th Anniversary

THIRTY years ago this month, the first of the now famous series, "The Adventures of Bill," appeared in The Foundry. In every issue since that time, with the exception of two back in 1922 when the artist was in the hospital, Bill has philosophized and lectured on any subject that might strike the fancy of the author. Over the years, tens of thousands of readers of this publication have been entertained, and at the same time have found bits of valuable information on many of the practical phases of foundry practice.

By collaborating in the production of the Bill stories for three decades, Pat Dwyer, creator and author, and Harry L. Richey, artist, have established a record which probably has not been equalled in the field of business and technical journalism or among magazines of general distribution. In 516 articles, the author has written in excess of 2 million words, and the artist has prepared approximately 1500 drawings.

Pat Dwyer joined The Foundry shortly after the first Bill story appeared, and today is probably the best known foundryman in the world. As engineering editor, he has written hundreds of articles on almost every phase of foundry practice, has appeared on the lecture platform before most of the foundry groups in this country and is the author of the book, "Gates and Risers for Castings." Harry Richey was in charge of the editorial art department of the Penton Publishing Co. when he prepared the first "Bill" drawings, and now is manager of the Penton Building, home of The Foundry. In addition to the ability for emphasizing the grotesque, Harry has won great fame as the inventor of foundry gadgets that will not work, or have no practical use to the foundryman if they did. As a result, originals of his drawings may be found hanging in foundries throughout the world.

While the task of guiding "The Adventures of Bill" for thirty years must seem tremendous in retrospect, the friendly letters and comments which have come to the author and artist should be a source of satisfaction for a job well done.

To Pat and Harry, congratulations from The Foundry gang, and many thanks for the hours of real pleasure given us by your vivid imagination and your unique talents for expression in word and picture.

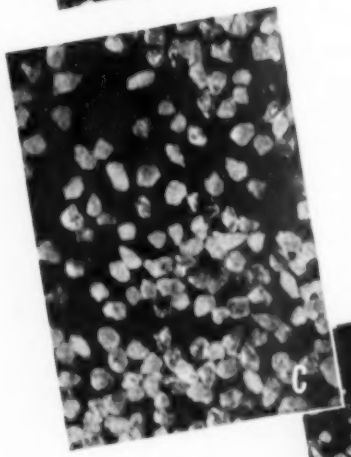
Frank G. Steinebach

EFFECT OF VARYING Particle Size

ABSTRACT

This investigation was initiated to determine the effect of particle size distribution on the green permeability and strength of a well known naturally bonded molding sand. Albany sand was used as the basic material and test mixtures were prepared by making separate additions—10, 20, and 40 per cent—of each of three selected sieve fractions of washed silica sand—Nos. 50, 100, and 200.

For individual additions of the sieve fractions the green permeability was increased and the green strength was reduced, the amount of change being roughly proportional to the amount added. In all cases, these additions caused a decrease of the percentages of subsieve particles and an increase of distribution indices (implying retention of the highest total percentages of sand on five adjacent sieves). In all instances, as the content of subsieve particles decreased and the distribution indices increased, the green permeability values increased and the green strength values decreased. The mixtures containing No. 100 additions had the highest distribution indices and the lowest percentages of subsieve particles. Correspondingly the green permeability of these mixtures was the highest and the green strength was generally the lowest as compared with other mixtures investigated.



THE importance of size distribution of the particles on the properties of molding or core sands is well known in foundry practice. Procedures for mixing various grades of sand to obtain desirable physical properties are of practical value in the foundry and merit further study in order to understand more clearly the behavior of sand mixtures. The purpose of this investigation was to observe the changes in green permeability and strength of composite sands possessing different particle size distributions effected by adding various percentages of three selected sand fractions to a well known naturally bonded sand.

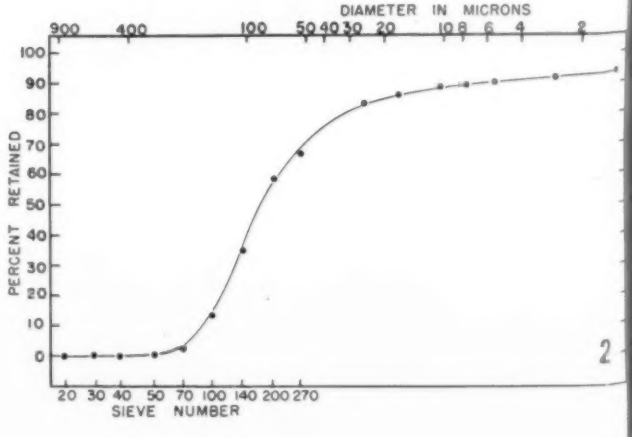
This study consisted of making separate additions —10, 20, and 40 per cent—of each of three selected

Fig. 1—Subangular sand grains, X10: *A*—Albany sand. *B*—No. 50 silica sand. *C*—No. 100 silica sand. *D*—No. 200 silica sand

Fig. 2—Cumulative curve showing particle size distribution of original Albany sand

Fig. 3—Cumulative curve showing particle size distribution of mixtures containing Albany sand with varying amounts of No. 50 silica sand. (Grain addition refers to sand particles retained on specified sieve. See text)

Fig. 4—Cumulative curve showing particle size distribution of mixtures containing Albany sand with varying amounts of No. 100 silica sand



Distribution

On Green Permeability and Strength of a Natural Molding Sand

By MARY T. ZEMANTOWSKY
and ALEXANDER I. KRYNITSKY
National Bureau of Standards
Washington

sieve fractions of washed silica sand—Nos. 50, 100, and 200—to Albany molding sand and determining the effect of these additions on the physical properties of the Albany sand.

Materials Used—The basic material used for this investigation was an Albany sand with an AFS fineness number 161[1]. In order to make sure that the basic sand used for the tests was uniform, approximately 350 pounds of this sand was thoroughly mixed by shoveling and riddling, tempered with approximately 4 per cent of moisture, sealed, and stored in half-gallon glass jars. A small amount of paradichlorobenzene was placed in each container to prevent fungus growth (mold).

Attempts were first made to separate the basic Albany sand into its components by washing to remove the clay, drying, and then sieving, but this method of separation was not satisfactory because the clay adhered to the sand particles and could not be removed entirely by washing. Consequently, the Nos. 50, 100 and 200 sieve fractions were obtained by oven drying and sieving three commercial grades of washed, subangular silica sand with AFS fineness Nos. 55, 112 and 150.

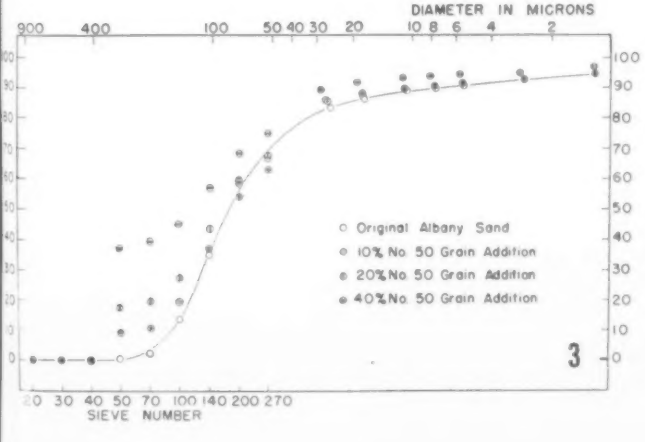
As a result of several tests it was found that the separation of a 100-g sample was comparable to that of a 50-g sample. Therefore, in order to accelerate the procurement of the necessary quantities, 100-g samples were sieved 15 minutes for the separation. The Nos. 50, 100 and 200 sieve fractions were repeatedly sieved to obtain the size uniformity shown in Table I. After the final sieving these sieve fractions were placed in half-gallon glass jars which were sealed and stored for later use as additions in the preparation of test mixtures. An example of the sand uniformity gained by repeated sieving of the No. 50 fraction may be seen in Table II. Photomicrographs of Albany sand and of Nos. 50, 100 and 200 sieve fractions of washed silica sand are presented in Fig. 1, and illustrate the subangular structure of these sands.

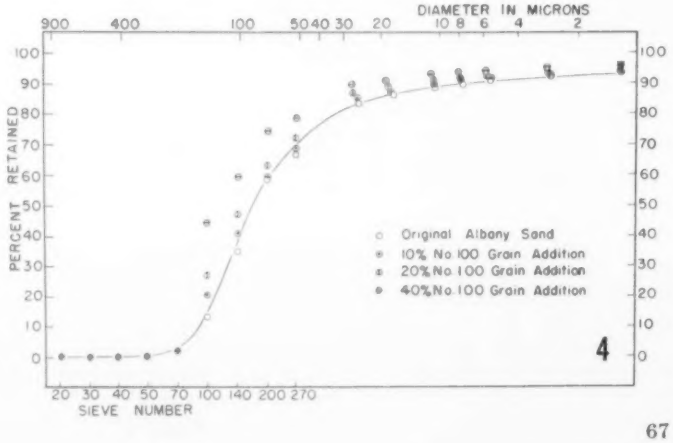
Test mixtures containing Albany sand with three separate additions of each of Nos. 50, 100 and 200 silica sand fractions were made in batches of 2000 grams as follows:

Silica Sand Fractions		Albany Sand		Total
Per Cent	Grams	Per Cent	Grams	Grams
10	200	90	1800	2000
20	400	80	1600	2000
40	800	60	1200	2000

Preparation of Sand for Testing—In the preparation of sand specimens the following procedures were used: At least 2000 grams of the prepared and stored Albany sand was oven dried and mulled dry for two minutes in an 18-in. laboratory mixer. Water was then added and mulling was continued for five minutes. After removing from the mixer the sand was riddled through a ¼-in. mesh sieve directly into a glass jar which was immediately sealed. The sand was allowed to temper at least 24 hours after which time it was riddled again before testing.

The 2000-g batches containing oven-dried Albany sand and selected sieve fractions of silica sand were mixed in a motor-driven rotating porcelain jar for two hours. The sands were next placed in an 18-in. laboratory mixer and mulled with 6 per cent moisture


DIAMETER IN MICRONS
900 400 100 50 40 30 20 10 8 6 4 2
Original Albany Sand
10% No. 50 Grain Addition
20% No. 50 Grain Addition
40% No. 50 Grain Addition
20 30 40 50 70 100 140 200 270
SIEVE NUMBER
3


DIAMETER IN MICRONS
900 400 100 50 40 30 20 10 8 6 4 2
PERCENT RETAINED
Original Albany Sand
10% No. 100 Grain Addition
20% No. 100 Grain Addition
40% No. 100 Grain Addition
20 30 40 50 70 100 140 200 270
SIEVE NUMBER
4

for five minutes, after which they were riddled into glass jars, sealed, and allowed to temper for 24 hours before testing.

Methods of Test—Except for the hydrometer fineness test, the sand testing methods used in this study were those described in the *Foundry Sand Testing Handbook* of the American Foundrymen's Society. Briefly, the tests were as follows:

Fineness—In grading sand particles according to their size two classes of particles were considered: larger particles which can be evaluated by sieving and finer particles which are too small to be measured by sieving. The former are fractions of the sand remaining on sieves larger than sieve No. 270 (53 microns). The latter are sand fractions which pass the No. 270 sieve and will be known in this study as "subsieve particles." Accordingly, in measuring fineness of different sand mixtures two tests were conducted: a standard AFS fineness test and a hydrometer fineness test.

In the fineness test the weighed, dried sand, after removal of AFS clay (particles less than 20 microns), was passed through a series of sieves stacked with the coarsest sieve (No. 6) on the top and progressing to the finest sieve (No. 270) at the bottom. Sieves of the U. S. Standard Sieve Series and a Tyler RoTap sieve shaker provided with an automatic time switch were used throughout.

The hydrometer fineness test was made according to the procedure described by Price and Krynitsky[2]. In this test, a calibrated hydrometer was used to determine the percentage of sand remaining in suspension after definite time intervals. The sample was dispersed in distilled water with a 3 per cent sodium hydroxide solution as a deflocculating agent. The suspension was maintained at 67°F. After the final hydrometer reading, the suspension was thoroughly shaken and all of the material was transferred to a No. 270 sieve and washed lightly with tap water for five minutes. The fraction retained on the No. 270 sieve was oven-dried, weighed, and analyzed in a series of standard sieves.

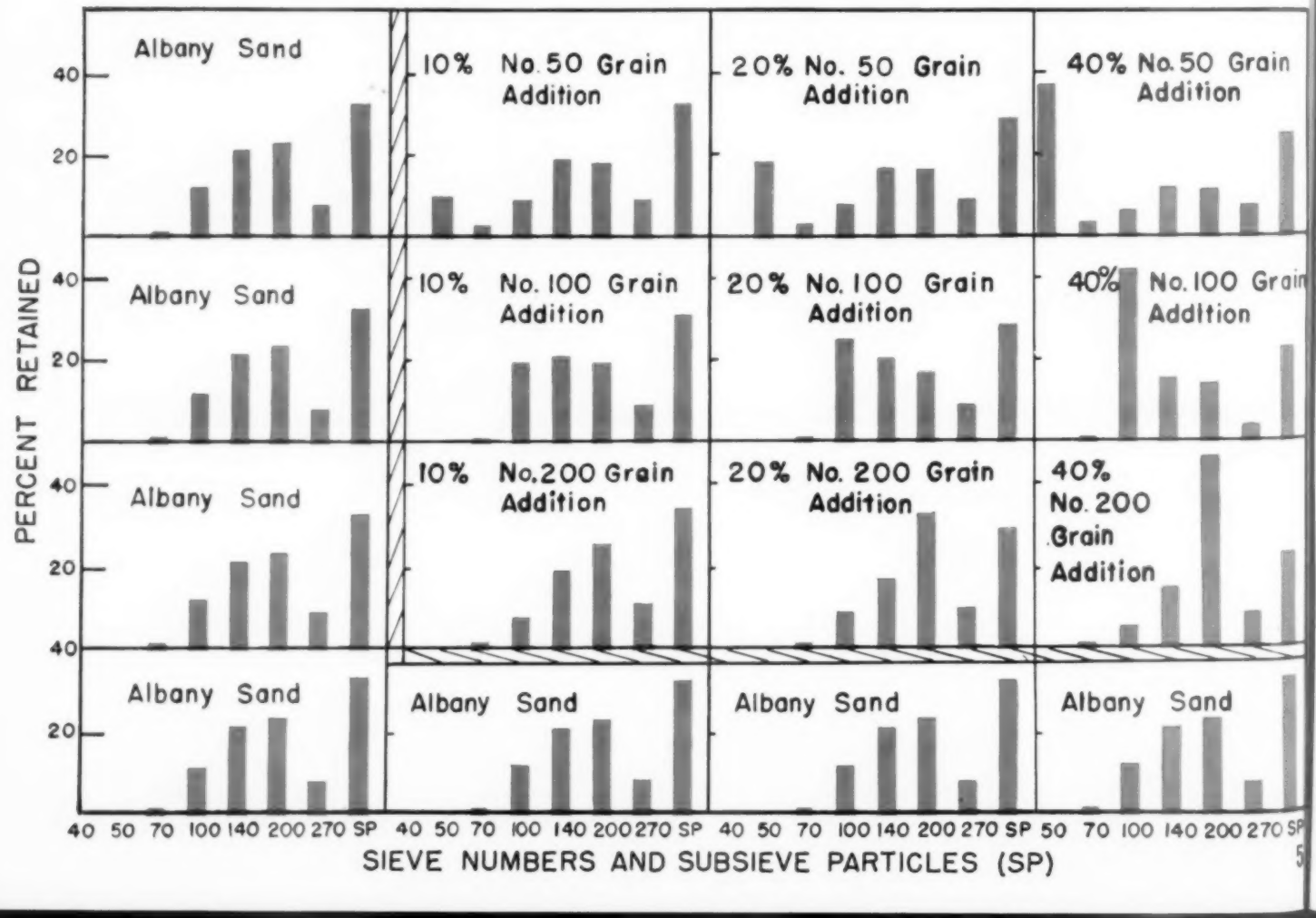
Particle Size Distribution

Green Permeability—The AFS standard method was used in determining the green permeability by measuring the rate of the flow of air through the standard sand specimen (2-in. diameter x 2-in. high, rammed according to AFS procedure) with a permeabiltiy air-flow apparatus.

Green Strength—The green strength of the sand mixtures was determined by the AFS standard green compressive and green tensile tests. The standard sand specimen (2-in. diameter x 2-in. high, rammed according to AFS procedure) was used in these tests. The apparatus used in these tests are the dead-weight types described in the Foundry Sand Testing Handbook.

Results of Tests—

Effect of Mulling—In the standard AFS method for preparing sand samples for testing by use of a lab-



oratory muller, no specification is given for the clearance between the muller wheels and the bottom plate of the mixer. In order to establish whether or not this adjustment was critical in the present experiments, different batches of Albany sand were mulled with clearances ranging from 0.03 to 0.30 in. Physical tests indicated no appreciable differences in the properties when the clearances were varied between these limits. However, the hydrometer test indicated that some of the sand particles were being crushed by smaller clearances. When the spacing was greater than 0.15-in. the muller wheels did not rotate properly. Consequently, a clearance of 0.1-in. was selected for use in these tests.

Effect of Moisture Content and Method of Drying: Some experiments were performed to establish the effects of different amounts of moisture on the physical properties of the basic sand. Albany sand batches were therefore prepared with moisture contents ranging from 5 to 7 per cent. Results of the physical tests of these mixtures showed that green permeability increased with moisture content, whereas green compressive and tensile strengths decreased. In the test mixtures the moisture contents varied from 5.7 to 6.2 per cent. For this range of moisture content, experiments showed a deviation from the average value for green permeability amounting to ± 0.3 units; green compressive strength, ± 0.3 pounds per square inch; and green tensile strength, ± 0.1 ounces per square inch.

Since the effects of these variations on the physical properties were small compared with those resulting from addition of the sieve fractions of sand, slight changes in moisture content were not considered in the tabulation of results.

Preliminary experiments indicated that the properties of the Albany sand varied considerably with the method of drying prior to the retempering and mulling of the test sample. For example, one group of test samples was oven dried and another group was air dried. Both groups were retempered to the same range of moisture content. Test results showed that the oven-dried sand had lower green compressive and tensile strength and higher green permeability than that which had been air dried. These results emphasized the importance of uniform pretreatment of the sand. Consequently, the sand used for test mixtures was oven dried at 105° C as recommended in the AFS procedure.

Effect of Adding Clay and Silt: In the first tests, proportionate amounts of clay and silt were added with the silica sand fraction so that the percentage of fine material in the test mixtures would be the same as in the basic sand. Additions ranged from 4 to 8 per cent of the No. 50 sieve fraction, 2 to 10 per cent of the No. 100 sieve fraction, and 5 to 20 per cent of the No. 200 sieve fraction. With the con-

TABLE I—Final Sieve Analyses of Three Selected Silica Sand Fractions Prepared for Addition to the Albany Sand

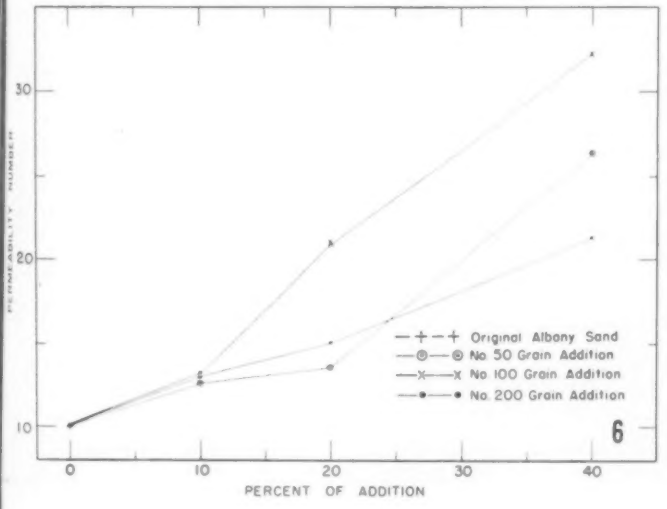
Sieve No.	No. 50 Fraction, Per Cent	No. 100 Fraction, Per Cent	No. 200 Fraction, Per Cent
20	0	0	0
30	0	0	0
40	1.0	0	0
50	96.0	0	0
70	3.0	1.8	0
100	0	92.9	0
140	0	5.4	1.8
200	0	0	95.7
270	0	0	2.5
pan	0	0	0

TABLE II—Sieve Analyses of the No. 50 Silica Sand Fraction Sieved 1, 2, 3, and 4 Times

(100-g. sample used for each sieving)

Sieve No.	Per Cent Remaining on Sieve (1)*	(2)*	(3)*	(4)*
20	.2	0	0	0
30	1.4	0	0	0
40	5.5	1.8	2.2	1.0
50	20.5	91.2	92.8	96.0
70	41.8	7.0	4.9	3.0
100	24.2	0	0	0
140	5.1	0	0	0
200	.9	0	0	0
270	.2	0	0	0
pan	.2	0	0	0

(1)* Sieve analysis of commercial washed silica sand, grade 40-60. (2)* First resieving of the No. 50 fraction. (3)* Second resieving of the No. 50 fraction. (4)* Third resieving of the No. 50 fraction.



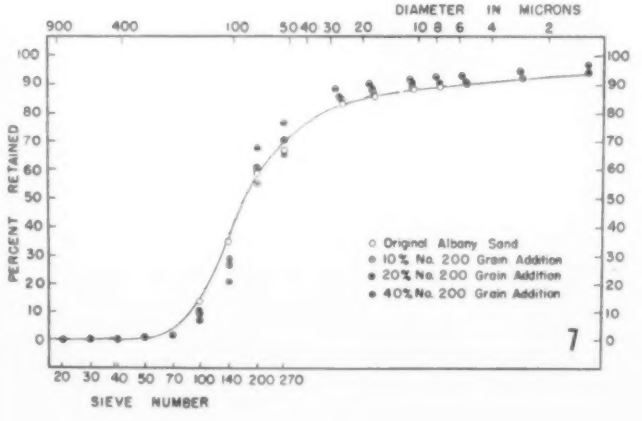
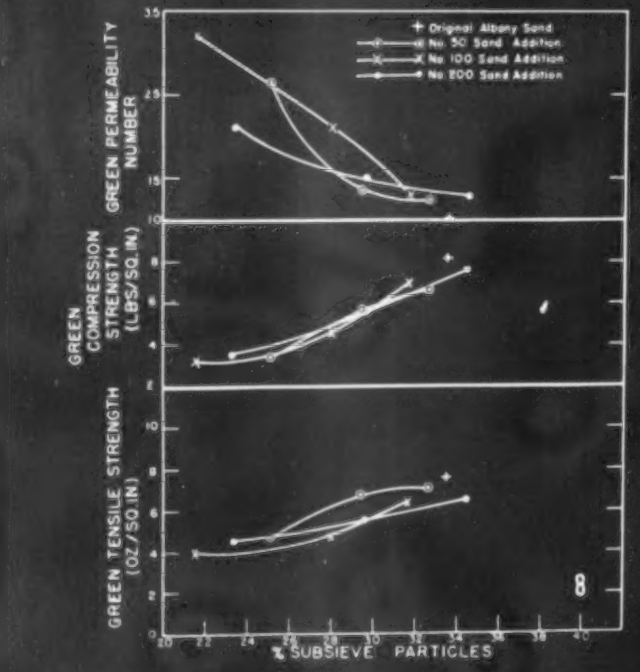
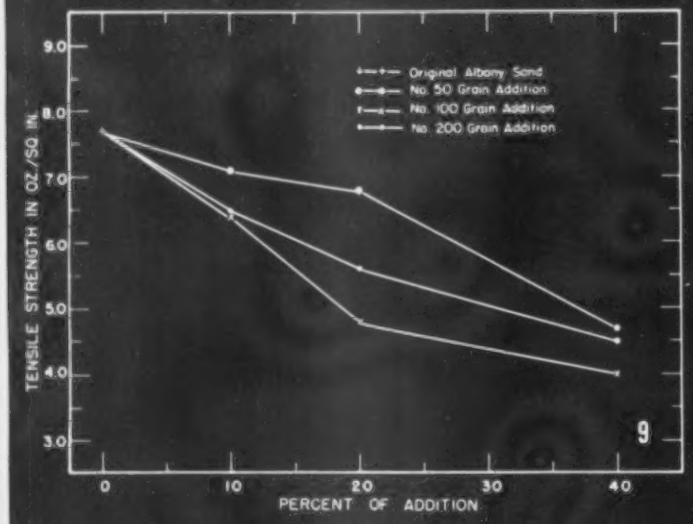

DIAMETER IN MICRONS
900 400 100 50 40 30 20 10 8 6 4 2
PERCENT RETAINED
100 90 80 70 60 50 40 30 20 10 0
Original Albany Sand
10% No. 200 Grain Addition
20% No. 200 Grain Addition
40% No. 200 Grain Addition
7
20 30 40 50 70 100 140 200 270
SIEVE NUMBER

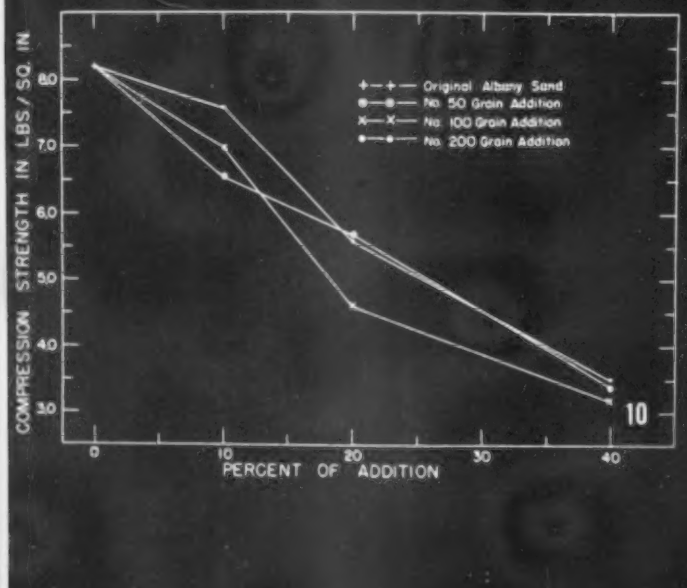
Fig. 5—Histogram showing particle distribution of Albany sand and its mixtures with 10, 20 and 40 per cent additions of No. 50, No. 100, and No. 200 silica sand. (Grain addition refers to sand particles retained on specified sieve. See text)

Fig. 6—Changes in green permeability of Albany sand produced by additions of varying amounts of No. 50, No. 100, and No. 200 sieve fractions of silica sand

Fig. 7—Cumulative curve showing particle size distribution of mixtures containing Albany sand with varying amounts of No. 200 silica sand







Particle Size Distribution

tent of clay and silt remaining constant the variation in the size and percentage of sieve fractions used in these tests had little effect on the physical properties of the test mixtures. This suggested that the fine particles in molding sand were of greater importance than the coarse ones in determining the properties of a sand.

Effect of Added Sieve Fractions on Size Distribution: In order to make a comparative study of the size distribution, fineness tests were made on the Albany sand and its mixtures containing three separate additions each of Nos. 50, 100, and 200 sieve fractions. The results of these tests are presented in Table III. The amount of subsieve particles shown in this table refers to the total percentage of particles washed through a No. 270 sieve after the hydrometer test and of those passing through a No. 270 sieve during dry sieving of residue.

In all mixtures as the addition of the sieve fractions increased, the percentage of subsieve particles decreased. However, it is of interest to note that the amounts of subsieve particles of mixtures with the No. 100 sieve fraction were consistently lower than those of mixtures containing the No. 50 or No. 200 fraction. One would hardly expect equal additions of the Numbers 50, 100, and 200 sieve fractions to produce a substantial difference in the percentage of the subsieve particles and, in general, this difference was small. It is difficult to explain why the amount of subsieve particles of Number 100 sieve fraction mixtures was consistently lower than those of other mixtures. It is possible that in general a certain amount of fine particles adhered to the particles of sand used in this investigation and that the No. 100 sieve fractions had a greater affinity to these fine particles than the Nos. 50 and 200 sieve fractions.

While there are several different arbitrary methods for the determination of particle size distribution index,[3, 4, 5, 6] the determination of the distribution index in the present study was based on the highest total percentages of material retained on five adjacent sieves. As will be noted in Table III, the distribution indexes for all mixtures increased after addition of each of the sieve sand fractions. The

Fig. 8—Effect of percentage of subsieve particles on the green permeability, green compression and green tensile strength of Albany sand mixtures with varying amounts of No. 50, No. 100, and No. 200 silica

Fig. 9—Changes in green tensile strength of Albany sand produced by additions of varying amounts of No. 50, No. 100, and No. 200 sieve fractions of silica sand. (Grain addition refers to sand particles retained on specified sieve. See text)

Fig. 10—Changes in green compression strength of Albany sand produced by additions of varying amounts of No. 50, No. 100, and No. 200 sieve fractions of silica sand

highest distribution index, 77.9, was obtained on the mixture containing 40 per cent of the No. 100 sieve fraction as compared with the distribution index of 65.9 for the Albany sand. It was found that the No. 100 additions in all instances gave higher distribution indexes than those of Nos. 50 or 200 sieve fraction.

The complete distribution of particle sizes, as determined both by the sieving test and the hydrometer method, is expressed most conveniently by a cumulative curve plotted on semilogarithmic graph paper. To construct this type of curve, the accumulated amount of sand particles, expressed in per cent that is retained on each successively finer sieve, is plotted against the diameter of the sieve opening. Thus the percentage of any given particle size represents the amount of that particular size plus the total amount of all the coarser particles.

In the subsieve range, using the hydrometer method, the percentage of particles finer than a specified size is determined. If "P" represents this percentage, "100-P" represents the percentage of particles coarser than the specified size. In constructing Figs. 2, 3, 4 and 7, the sieve data in Table III were used to plot the coarse sand grains, while the hydrometer test data in Table IV were used to plot the subsieve particles.

The cumulative curves for the various mixtures indicate only a slight difference in the distribution of their subsieve particles. However, these curves show a marked difference in the distribution of the coarser grains (i.e., larger than 53 microns in diameter) for all sand mixtures used in the investigation.

The particle size distribution of the sand mixtures is also presented in Fig. 5. Each bar in the chart represents the percentage of sand by weight retained on the various sieves used for the sieve analyses. The bar showing the quantity of subsieve particles represents all the particles passing through sieve No. 270 (53 microns). To facilitate comparing the size distribution of the various sand mixtures with that of the basic Albany sand, the histogram for the latter has been repeated along the left-hand side and bottom of the chart.

In all instances the 40 per cent addition of the three sand sizes produced a marked peak corresponding to the particular size of sieve fraction being added. Although the 40 per cent addition of the No. 100 fraction had the highest distribution index, examination of the histogram revealed an undesirable severe peak at the No. 100 sieve positions.

Effect on Physical Properties: The results of tests of the physical properties for the Albany sand and its mixtures are listed in Table V. The values for each physical property shown are the average of three determinations made (*Please turn to page* 272)

TABLE III—Sieve Analyses of Albany Sand and Its Mixtures Containing Nos. 50, 100, and 200 Silica Additions After Completing Hydrometer Tests

(Percentages)

	Basic Albany Sand		No. 50 Silica Addition						No. 100 Silica Addition						No. 200 Silica Addition					
			10%		20%		40%		10%		20%		40%		10%		20%		40%	
Sieve No.	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative	Single Amount	Accumulative
20	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.1	.1	.1	.1	.1	.1
30	.1	.2	.1	.2	.1	.2	.1	.2	.1	.2	.1	.2	.1	.1	.1	.2	.1	.2	.1	.2
40	.1	.3	.2	.4	.2	.4	.2	.4	.2	.4	.1	.3	.1	.2	.1	.3	.1	.3	.1	.3
50	.3	.6	9.8	10.2	18.2	18.6	37.1	37.5	.3	.7	.3	.6	.3	.5	.3	.6	.3	.6	.2	.5
70	1.5	2.1	2.2	12.4	2.9	21.5	2.5	40.0	1.5	2.2	1.4	2.0	1.7	2.2	1.6	2.2	1.3	1.9	1.1	1.6
100	11.8	13.9	9.3	21.7	7.9	29.4	5.8	45.8	18.6	20.8	25.3	27.3	42.4	44.6	7.2	9.4	8.2	10.1	5.2	6.8
140	21.2	35.1	18.8	40.5	16.4	45.8	11.6	57.4	20.3	41.1	19.9	47.2	15.2	59.8	19.7	29.1	17.1	27.2	14.4	21.2
200	23.3	58.4	18.2	58.7	16.2	62.0	11.3	68.7	18.4	59.5	16.3	63.5	14.3	74.1	26.1	55.2	33.4	60.6	46.8	68.0
270	8.1	66.5	8.9	67.6	8.6	70.6	6.3	75.0	9.0	68.5	8.6	72.1	4.3	78.4	10.4	65.6	10.0	70.6	8.7	76.7
Subsieve Particles*	33.5		32.6		29.4		25.1		31.7		28.0		21.6		34.5		29.6		23.4	
Distribution Index**	65.9		58.3		61.6		68.3		67.8		71.5		77.9		65.0		70.0		76.2	

* Includes particles washed through No. 270 sieve after hydrometer test plus particles passing through No. 270 sieve during dry sieving of the residue. ** Implies the highest percentage of the grains retained on five adjacent sieves.

TABLE IV—Hydrometer Data on Albany Sand and Its Mixtures Containing Nos. 50, 100, and 200 Silica Sand Additions

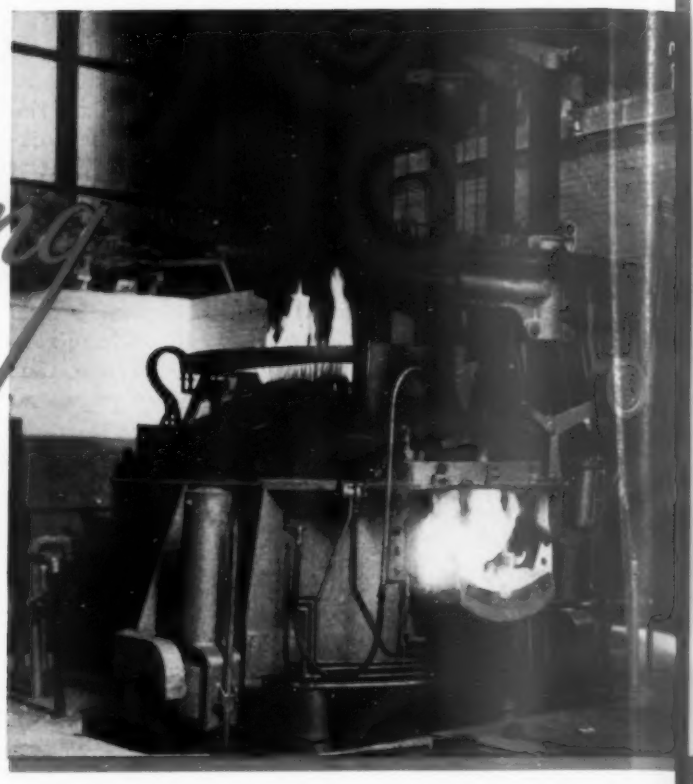
(Particle Size in Microns)

	Albany Sand		No. 50 Silica Addition						No. 100 Silica Addition						No. 200 Silica Addition					
			10%		20%		40%		10%		20%		40%		10%		20%		40%	
Time of Settling, Min.	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative	Particle Size	Accumulative
2 ...	25.7	83.8%	26.8	85.5%	27.0	86.0%	28.8	89.6%	26.2	85.0%	27.4	86.9%	28.2	88.9%	26.2	85.3%	26.8	85.9%	28.0	88.7%
5 ...	17.2	86.2	17.5	87.7	17.7	88.3	18.9	91.6	17.5	87.5	18.1	89.1	18.8	91.1	17.4	87.5	17.8	88.7	18.4	90.4
15 ...	10.4	88.6	10.6	89.9	10.6	89.9	11.2	93.2	10.5	89.5	10.7	91.0	11.2	92.8	10.6	89.9	10.7	90.8	11.0	92.2
30 ...	7.5	89.7	7.6	90.6	7.6	90.6	8.0	93.9	7.5	90.6	7.7	91.8	8.0	93.6	7.6	90.6	7.7	91.2	7.9	93.0
60 ...	5.4	90.6	5.5	91.6	5.5	91.6	5.7	94.4	5.4	91.4	5.7	92.6	5.8	94.2	5.5	91.4	5.5	91.9	5.7	93.8
250 ...	2.7	92.1	2.7	92.6	2.7	92.9	2.8	95.3	2.7	92.8	2.8	93.8	2.8	94.9	2.7	92.6	2.7	92.9	2.8	94.5
1440 ...	1.2	94.1	1.2	94.5	1.2	94.4	1.2	96.8	1.2	93.8	1.2	94.9	1.2	95.9	1.2	94.5	1.2	94.5	1.2	96.5

Accumulative percentages are equal to "100-P" where "P" is the percentage of sand particles remaining in suspension at a specified settling time.

Steelmaking at a BRITISH FOUNDRY

By NORMAN F. DUFTY
Sheffield, England



(Above)—Close-up view of 5-ton basic-lined furnace at K. & L. Steelfounders & Engineers, Letchworth, England
(Right)—General view of electric arc furnace melting shop. Five-ton acid furnace is in foreground, 5-ton basic unit in background

PRIOR to August, 1947, the steelmaking plant at K. & L. Steelfounders & Engineers, Letchworth, England, consisted of four 2½-ton converters. Although the steel made by this process was of consistently high quality and had a long fluid life in the foundry, the decision was made to install two 5-ton electric arc furnaces. There were several reasons for this, the main one being the superior quality of electric steel. Other advantages were closer control of temperature and analysis, wider range of analyses that could be made and the ability in the case of the basic furnace, to make high-quality steel from low-grade scrap if this became necessary for economic or other reasons. The first heat was poured Aug. 27, 1947.

Two Birlec model P. T. nose-tilting furnaces were installed and lined to take a 12,000-pound charge. They are housed in a separate shop running at right angles to the two main foundry bays. Furnaces, scrap bins and nonmetallic material store are all under one roof and a single crane track; the railroad runs through the shop and there is a concrete road for off-loading trucks.

Raw materials enter at the end of the shop remote from the furnaces. Scrap is unloaded by electromagnet either direct into the charging buckets or into the 12-feet-high storage bins. Limestone, iron ore, fluorspar, etc., are unloaded into brickwalled bins where they remain until required for use on the furnace. Electrodes and refractories are stored on the specially strengthened transformer house roof where they are kept dry and at the same time are readily available when needed.

The department is served by two 10-ton cranes designed and built by the company. One does all the necessary work on the furnaces and is in use 24 hours a day. The other, normally equipped with an electromagnet, is chiefly concerned with unloading scrap and making up furnace charges and is used 16 hours a day.

A battery of four underfeed stokers has been installed for ladle heating and six forced-draft coke fires, which were formerly used on the converter plant, are held in reserve in the foundry.

The furnace shells are of conventional mild steel plate construction with hydraulic tilting and roof slewing mechanisms. Angles of tilt available are 45 degrees forward and 10 degrees backwards. The rear end of the shells rest on movable stools; these are disengaged by compressed air to permit back tilting for slagging off. A stop on the shell above the taphole and a clamp on the opposite side prevent any roof movement while tilting. Numerous interlock switches are provided to ensure that the furnaces are not tilted with the power on, etc. Water cooling is employed for the electrode clamps, cooling rings, roof ring and the base of the furnace door.

Both furnaces have Westinghouse automatic controls. Oil circuit breakers are used and these cannot be tripped under load except by an emergency button. In addition to the normal overload and short circuit trips, there are warning and safety devices which operate in event of water supply failure or overheating of the transformers. A mercury arc rectifier supplies the direct current necessary for the furnace auxiliaries. The electrode arms are counter balanced and their movement is controlled by dc winch motors

operated manually or by the automatic control. Fully automatic fire extinguishing equipment protects the control gear and transformers. The furnaces tilt in opposite directions into separate ladle pits.

To obtain the even flow of metal required by the foundry it was necessary to use an 1800-kva transformer on the basic furnace and one of 1200-kva capacity on the acid. In this way the longer melting time on the acid furnace is balanced by the shorter refining time, giving each furnace approximately the same production per hour,

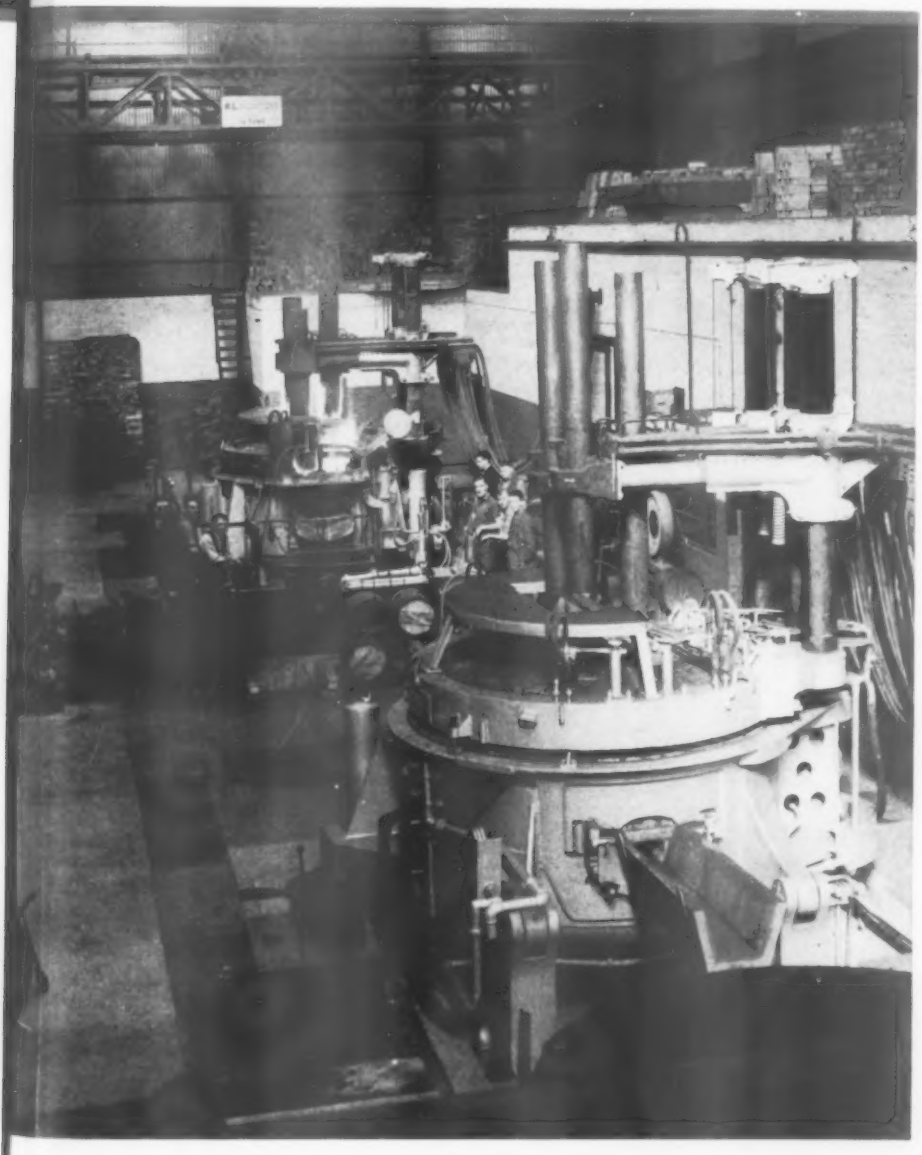
Fifty-cycle high tension current at 11,000 volts is supplied to the furnace transformers from a 3000-kva alternator set at the local power station. To minimize the overload swings and limit the short circuit current, 30 per cent built-in reactance on the transformers is used on the high voltage tappings in addition to the inherent secondary reactance of the systems. The shop foreman and shift engineer at the power station are connected by a direct telephone line and weekly conferences between the melting plant superintendent and the generating engineer ensure adequate liaison. This is absolutely essential as the melting plant takes a large proportion of the total load on the station.

The shop is equipped with normal services such as telephones, compressed air, low tension power points, etc. A pneumatic tube connects the plant with the laboratory, but all samples are drilled before dispatch.

Tinsley quick-immersion platinum-platinum rhodium thermocouples are used for taking bath temperatures and a common amplifier-recorder unit is located between the two furnaces. Tool rack, water bosh, weighing machine and bins for alloys, non-metallics and patching materials are conveniently situated between the two furnaces.

Ladles are transferred from the melting shop to whichever foundry bay they are needed, on a rubber-tired truck hauled by a tractor.

Roofs—Both furnaces have 12-in. thick silica roofs, although a serpentine brick is being tried for the roof on the basic furnace. The small standard shapes, as recommended in the British Iron and Steel Institute's second report on refractories, are found to be superior to the large specially shaped silica blocks formerly used. This is undoubtedly due to the fact that these smaller bricks can be more thoroughly and consistently burned by the manufacturer. The skewback angle is 71 degrees and the roof rise in the centre is 1 in. per foot of diameter. Tarred felt inserts to the extent of $\frac{1}{8}$-inch per foot make adequate allowance for expansion.



On the basic furnace roofs wear rapidly but evenly. Foundry requirements of high-temperature metal, usually involving holding half the heat at about 3050° F for 20-30 minutes, are the main cause of the short roof life, 45 heats.

In the absence of basic oxides in the furnace atmosphere, roofs on the acid furnace last about 250 heats, despite the unfavorable conditions mentioned above, with tapping temperatures often as high as 3130° F. Failure is usually due to spalling at the skewbacks and adjacent courses, probably caused by air infiltration between the top of the furnace wall and the roof ring.

The dust inevitable in any melting shop collects on the furnace roofs, effectively insulates them, and may cause overheating unless it is periodically removed by blowing down with a compressed air line.

Basic Furnace Lining — On the basic furnace a 3-in. course of chrome magnesite bricks is laid on the bottom of the shell and carried to 9 in. above the slag line. The hearth (*Please turn to page* 256)

The Antioch Process of Metal Ca

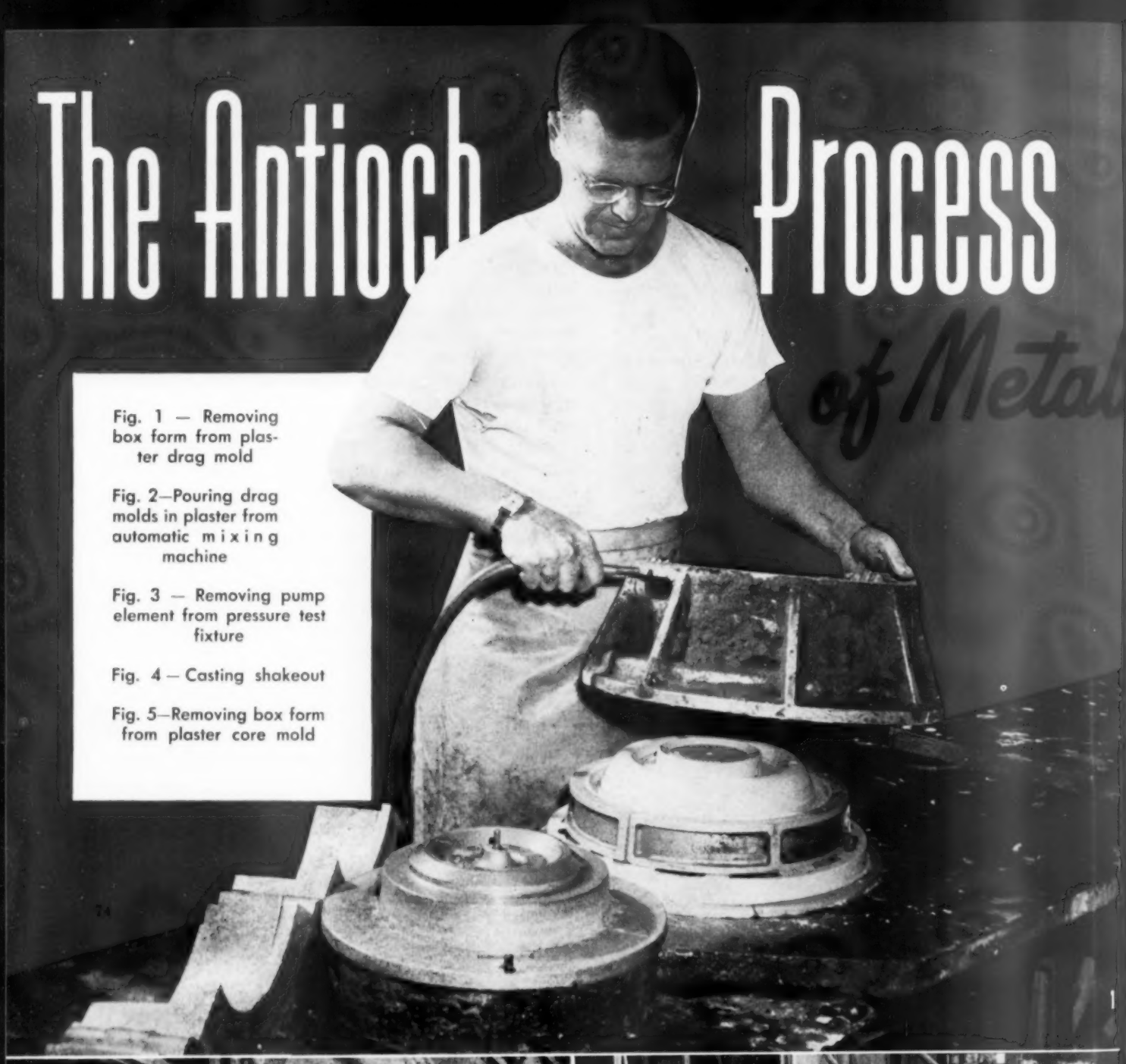


Fig. 1 — Removing box form from plaster drag mold

Fig. 2—Pouring drag molds in plaster from automatic mixing machine

Fig. 3 — Removing pump element from pressure test fixture

Fig. 4 — Casting shakeout

Fig. 5—Removing box form from plaster core mold

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The author describes a method of casting aluminum automotive parts in molds having gypsum as their basic ingredient. This paper was presented at the SAE National Production Meeting and Clinic at Cleveland, Oct. 21-22

By E. A. CANNING
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Casting

IN THE manner of everyday conversation, we occasionally hear the expression, "Let's take a look at the doughnut instead of the hole." That expression invariably strikes a responsive chord, meaning much more to me in my thinking since reading H. G. Weaver's book *Main Spring*. Therein he declared in effect that in recent years the negative side has been so overstressed, he made no apologies for concentrating on the doughnut instead of the hole. Therein he emphasized the fact that throughout all of recorded history, human beings have made progress only during a few relatively short periods or spans of time. Therein he condemned the voluntary submission by human beings to pagan gods of authority retarding the effective use of human energy that might be made by each and every individual as a free man. Therein he directs attention to the progress accomplished by the Saracens as relatively free men during the eighth to twelfth centuries under leadership of the Moslem Arabs. Finally he emphasizes the great progress achieved during the short history span of our nation made possible with the freedom established by the founders of our constitution, but he warns of the great dangers to our progress if by misguided thinking we enslave ourselves to false gods of authority.

The foregoing thoughts appeal to me because, while accounting for the failures and setbacks in history, they hold more than a promise for far greater social and scientific advancement. Certainly with respect to the foundry, as well as other aims, they offer great opportunities.

Considered in retrospect, the art of casting metals, although not the oldest known to man, is very ancient, but frequently I feel that many of us in the industry are back there working in those dark ages. I believe foundry progress has been delayed by many pagan gods of authority which, until as recent as ten years ago, included superstition and tradition. At present, customs, inertia and prejudice are pagan gods delaying advancement.

Much of the present day foundry art, so called art, being possibly open to ridicule if termed a science, was practiced in the region and in the time of the ancient city of Antioch. The use of lost wax and plaster was then employed in molding and fabricating countless works of art. For that matter, beautiful metal objects in our museums show evidence that molders used lost wax and stone molds 4000 years B. C., possibly centuries before resorting to sand.

As a further example, we read that in India may be seen an almost perfect example of iron, so pure it has not deteriorated from rust. It is approximately 17 tons in weight, stands 23 feet above ground, and yet, based on the inscriptions appearing on its surface, it was molded or formed 9 centuries B. C. Then again passing almost 2000 years, we have all heard

of the celebrated steel swords from Damascus used in the defense of Antioch and other cities during the Crusades. Certainly we may appreciate that a relatively advanced stage of molding was essential in the preparation of ingot for such steel. Some of the old processes compare favorably with our modern methods, and yet they were employed by the Saracens back in the ages of the eighth to twelfth centuries.

In the intervening time since the days of Antioch, more particularly during the history of this nation, I do not believe that foundry methods have kept pace with other branches of science. As is well known, nuclear science has isolated hundreds of isotopes, but as yet we do not know how best to control the change in state of metals from liquid to solid. To my mind, if we did know, we should then obtain homogeneous metal sections having superior physical properties without resorting to the hammer and forge. We have yet to see what might be called a perfect casting.

The Antioch process as employed at the Bedford plant of Allison Division, does not exactly derive its name from the ancient city. The development was much more recent than the foregoing history. It provides many advantages in certain operations, and may yet enable us to produce that perfect casting. However, the process is lacking considerably in economy. For the present it is only employed in specialized operations. My first contact with the Antioch process occurred in a trip through the foundry of that name about 12 years ago. The plant was merely a renovated barn located near the campus of Antioch College not far from Dayton, O. This modest setup was operated by Mr. and Mrs. Morris Bean. Co-operative students of the college were employed as laboratory assistants.

The visit to Antioch was a revelation. The first object that met the eye on entering that barn was a huge bust of a man cast in bronze. Nearby stood another statue of a horse. Here we found the process of making castings truly exemplified as an art, which used lost wax in combination with plaster molds. Nevertheless, the walls of that barn contained evidence of the sweat of genius illustrated by crude but most interesting molds and equipment.

Our present process does not employ lost wax, but was developed entirely through the efforts of Mr. and Mrs. Bean. The basic ingredient of the mold material is gypsum, known under the chemical name of calcium sulphate. Our supply comes from mines in Michigan, but it differs from normal plaster material in specifications for purity and grain size. Added to the gypsum in a dry mix are a number of other materials which include sand, asbestos, talc and sodium silicate. These ingredients are mixed dry in closely controlled proportions, and all contribute properties necessary in the finished mold.

Following the dry mix, water is added in controlled proportions. The resulting wet mix or slurry looks like ordinary gray plaster but hardens or sets in a shorter period of time, from five to ten minutes, depending upon the cycle required in production. The wet mixing operation is accomplished by an automatic machine which delivers the slurry through a hose. The delivery rate of the machine is under the control of the operator, and there is no loss of material such as may occur from an excess in batch mixing.

At this point the slurry is hosed into metal boxes to form the molds and cores. On setting they are in what is termed a green condition. They are then assembled into completed molds, but in addition are given considerable process or curing treatment before being used as the envelope for a casting. The curing process involves setting in the green condition for six hours. The molds are then placed in an autoclave, a sealed steam chamber, for about six hours, under a steam pressure of 17½ lb gage. The molds are then air cured for 12 hours and finally oven dried at 450° F from 12 to 20 hours, depending upon the size. They are then (*Please turn to page* 230)

Fig. 6—Metal pouring conveyor

Fig. 7—Dimensional inspection of turbine element

Fig. 8—Pressure testing pump element of torque converter transmission

Fig. 9 — Mold assembly line for torque converter transmission

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IRON MELTING COSTS

In the cupola and electric furnace

MANY iron foundries have experienced serious trouble because of the inferior quality of the coke which they are obliged to use in their cupolas. This coke is responsible for slow melting, cold iron, dirty iron, high sulphur iron and misrun castings. Even with metal-to-fuel ratios of 6 or 4 to 1, many foundries find it difficult to melt iron having a temperature sufficient to insure good castings.

Electric power rates for several years have held at a fairly stable level, and in some localities are even showing a downward trend for commercial use. The price of coke, on the other hand, has been climbing steadily and today stands at an all-time high. As a result of the increased cost of coke, together with a serious decline in quality, many foundrymen recently have been investigating the possibilities of using the electric furnace for melting iron.

If coke of prewar quality were obtainable, the foundries would not be quite so concerned about the price, because cupola melting fits better than any other melting unit the operating conditions in most foundries.

When an electric furnace is being considered for comparison with cupola melting, two methods of operation should be investigated and carefully evaluated, namely, batch melting and duplexing. The three factors of greatest importance for any method of operation are (1) investment required, (2) operating

cost, and (3) operating conditions.

Iron foundrymen are familiar with cupola operation, but for purpose of comparison with other methods of melting, it will be well to review some of the reasons why at least 95 per cent of all iron foundries have relied on cupola melting for as long as gray iron castings have been made.

The cupola is lower in first cost than any other melting unit of comparable capacity. Conversion cost is lower than for any competing furnace, and when good coke was obtainable, competition from other furnaces for the production of cast iron was negligible.

The cupola is a truly continuous melting unit whose melting rate can be accurately adjusted to the operation of the large production foundry or the small jobbing foundry.

At one time, only a few years ago, metal at the cupola spout cost close to $20 per ton, and conversion cost represented $2 to $2.50 per ton of the total. Today's figures are quite different.

In order to compare cupola operation with two methods involving the electric furnace, let us consider as a specific case, a foundry melting 60 tons per day, or about 15,000 tons per year, making light and medium size castings, for which the desired temperature at the spout is 2750 to 2800° F. Assume that the cupola is equipped with a good mechanical charging system.

Cupola Investment—The equipment involved, together with approximate present-day prices, is shown below:

1—No. 7 cupola and accessories	$3,600
1—6000 cfm., 40 oz. pressure blower	5,000
1—Skip hoist charger	11,000
1—Coke and stone bin	8,000
1—Yard crane, plus 100-ft runway	40,000
	$67,600

Annual depreciation charge on a 20-year basis is $3380, or 22½ cents per ton on the 15,000-ton annual melt. Incidentally, a 15,000-ton per year foundry can recover the investment in a yard crane in about four years through savings for unloading materials only. In addition, a handsome saving can be had through magnet make-up of the charge.

Cupola Melting Cost—Based on a 60-ton daily melt, the following represents a reasonably accurate estimate for the cost to operate a cupola under present conditions:

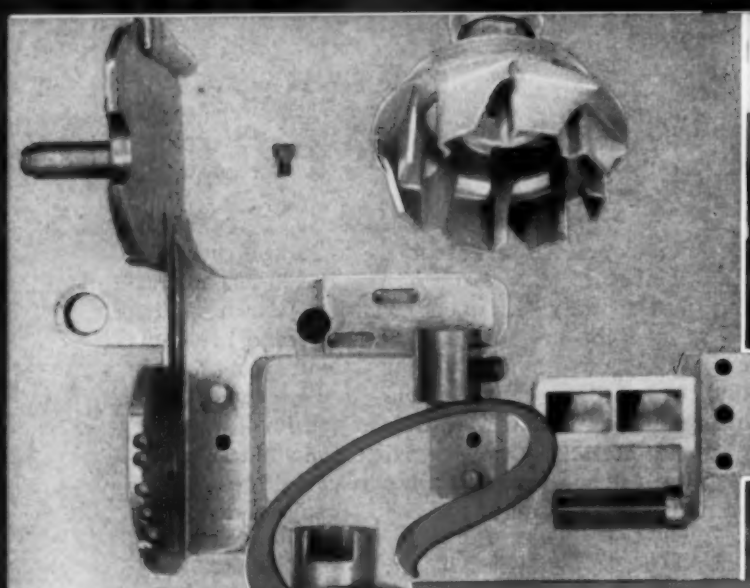
	Cost per Ton Metal Melted
Coke @ $20 N.T.—Ratio 6 to 1	$3.33
Stone @ $3 N.T.—100 lb per ton	.15
Power @ 1c Kwhr—5 Kwhr per ton	.05
Operating labor—4 men @ $1.50 per hr	.80
Refractory materials	.50
Oil for heating ladles	.10
Miscellaneous maintenance labor	.10
Soda ash @ 1.3c per lb—10 lb per ton	.13
Depreciation	.23
Total (spread charges not included)	$5.39

If we assume that the metallic charge will cost $70 per ton, the total cost of metal at the spout will be $75.39.

The No. 7 cupola will melt about 10 tons per hour, or 60 tons in 6 hours. If the foundry has a mechanized molding and pouring department, and desires to melt the tonnage over an 8-hour (*Please turn to page* 244)

Far Left—2-ton electric furnace pouring iron in duplexing operation. Cupola metal is delivered from the spout to the furnace

Left — Cupola metal is delivered to this 6-ton electric furnace by ladle



LARGE SCALE PRODUCTION OF

Small, Intricate

By ROBERT H. HERRMANN

Assistant Editor
THE FOUNDRY

MANY old-time foundrymen claim that romance is dying out in the industry. There used to be a time, they say, when the entire process involved in making castings was an art. Now, all the "molder" does is slap a matchplate on a molding machine and start punching out molds—no romance, they say. They decry the entrance of so many specialists into the industry, and to substantiate their argument they point to the melting department. Composition of the metal is planned well in advance and carefully controlled throughout the melt. The industry, for the most part, has got away from some of the haphazard practices of days gone by. Remember the story about the cupola foreman who threw a little white paper envelope into the melt each day? The envelope, he said, contained a secret potion that gave the metal the necessary characteristics for producing sound castings. The envelope contained a handful of heap sand.

Yes, that kind of romance is gone. It seems, however, that the ear can detect in the moanings of the old timers a slight note of jealousy for the present foundry practices. The work nowadays is a lot easier, the quality of the castings a lot better, production greater and results more uniform and dependable than they were years ago. It may be that this is the crux of the thing. Romance really isn't gone from the

Fig. 1—Section of the room where dies and models are machined

Fig. 2—Hand operated wax injection machines for making expendable patterns

e Castings

foundry industry; it just has become more refined.

The new, the unexplored, the fringe of great possibility always have romance, and there is a branch of the foundry industry that falls right into this classification—precision investment casting. The process got its start, industrially, in the 1930's when someone conceived the idea of making duplicate expendable patterns so that many identical pieces could be cast at one time. Thus the process became adaptable to mass production methods which require identity of product.

Development of the process was extremely slow during its first years. The great need for expanded production during the recent war, however, gave the new industry a boost and helped to reveal the opportunities which it offered. True, the process has been used for years by jewelers, sculptors, dentists and others. The men in these trades use the process to produce ornate or individualistic castings, and in many cases only one of a particular kind will be produced. Patterns are produced individually for each casting; they are not duplicable.

The simple idea of having identical expendable patterns opened the door and placed the industry where it is today, just inside the threshold of unlimited industrial expansion. It's new; it's going places, and it's full of romance.

Those are the opinions of Robert R. Miller, president of Precision Metalsmiths Inc., Cleveland, a comparatively new firm engaged in precision investment casting. The firm is new in the sense that it has been in business about five years, but that length of time makes it an old timer in an industry which is

Fig. 3—Castings produced by the company are cast from steel and alloys of steel, beryllium-nickel, beryllium-copper, brass, bronze and aluminum

Fig. 4—Cleaning wax patterns and assembling them on sprues

Fig. 5—Placing flasks around pattern "trees"
Fig. 6—Air bubbles are removed from investment by vacuum

not much older.

During that time the company has obtained recognition in its field of endeavor, as indicated by the great variety of items which it has cast. Some of the castings produced are shown in Fig. 3. The photo includes castings made from alloy steel, beryllium-nickel, beryllium-copper, brass, bronze and aluminum. Practically every piece is a challenge to the ingenuity of the firm which does its own designing, makes its own dies and has got into production runs involving hundreds of thousands of pieces.

The company does a lot of development work for its customers. At the time of this writing it was engaged in some highly secret experimental work on parts for a new type telephone. It also was participating in development work on intricate parts for aircraft engines for the armed services. Such jobs

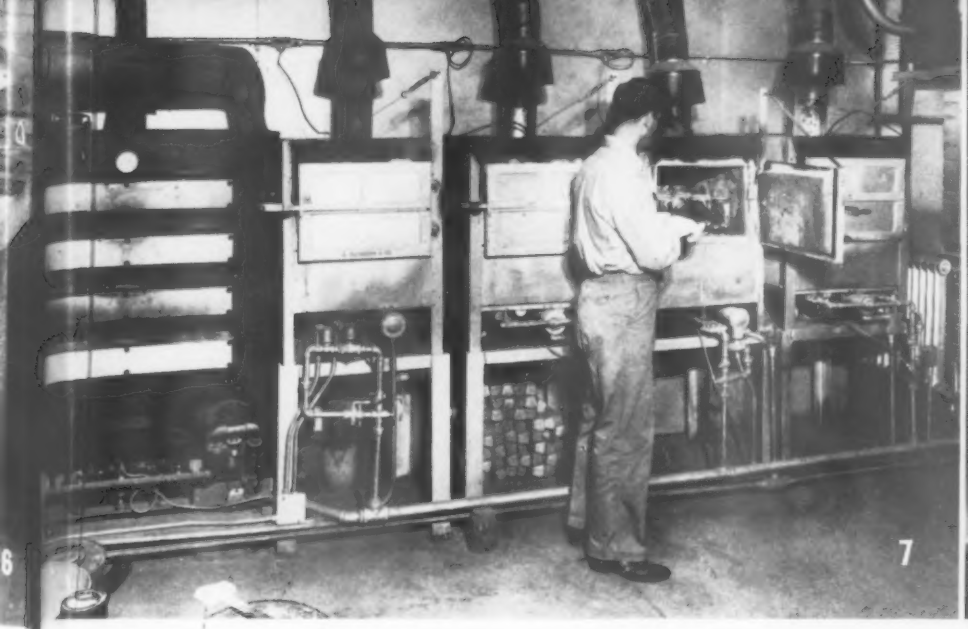


Fig. 7—Wax patterns are melted out of molds in oven at left. Molds are superheated in the other ovens just prior to pouring

Fig. 8—Vibrator is used for removing hardened investment material from trees of castings

carry plenty of romance.

Along with this development work the company was engaged in the routine production of items among which were fittings for fluid-carrying hoses, a part for an electric phonograph pick-up arm so small that 750 of them weigh only 1 ounce, and an aircraft engine fuel pump rotor. Most of the castings produced by the company are small and intricate and their weights usually do not exceed 1 pound. Castings are produced to tolerances which on the average are plus or minus 0.005-in. per inch. Tolerances, however, can be increased or decreased depending upon the individual item that is being cast. For instance, a beryllium-nickel fuel pump blade for a turbo-jet engine was cast to a tolerance of 0.001-in. per inch. Furthermore, the company seems to have very little difficulty with respect to cored holes. One of the castings produced there was cast with a cored hole $\frac{3}{4}$-in. long and 1/64-in. in diam.

Although it is true that a good many items which formerly were thought of only as machine shop jobs can be cast and in many cases at less cost, the industry should not be considered a performer of miracles. There are limitations, of course, but already it is doing a job that a few years ago existed only in the dreams of some foundrymen.

Production facilities of the plant are housed in five rooms which measure, on the average, about 16 ft sq, and a sixth room which is about half that size. The offices and a lunch room are in addition to these. Employment is 23 persons including the president. Fig. 1 is a view of the largest room in the company's set-up, and it houses the machine, design, and inspection departments. Because the company usually starts from scratch in developing equipment for manufacturing a casting for a customer, there usually is a great deal of experimental work involved in turning out the necessary mold or molds for producing the wax patterns.

Occasionally a mold has been made from a blueprint and has gone through the entire production run practically without being changed. This is a rare instance, however, not because of lack of skill or experience upon the part of the engineering department, but mainly because changes are made in the mold as design improvements are discovered either from the point of view of production procedures or because final use to which it is put dictated changes which would provide greater utility in the piece. These changes usually are of a minor nature and are easy to make.

A certain amount of development work is required on a new job in any foundry, and this branch of the industry is no different. Most of the items cast at Precision Metalsmiths formerly were machined from bar stock or fabricated by a manner other than casting. The design of such parts necessarily must be altered somewhat to adapt them to the casting technique. (*Please turn to page* 172)

Fig. 9 — Castings are cleaned up with small grinders and visually inspected

Fig. 10—Dies get a final check before being released for production runs

Fig. 11 — Molds are poured with the aid of vacuum

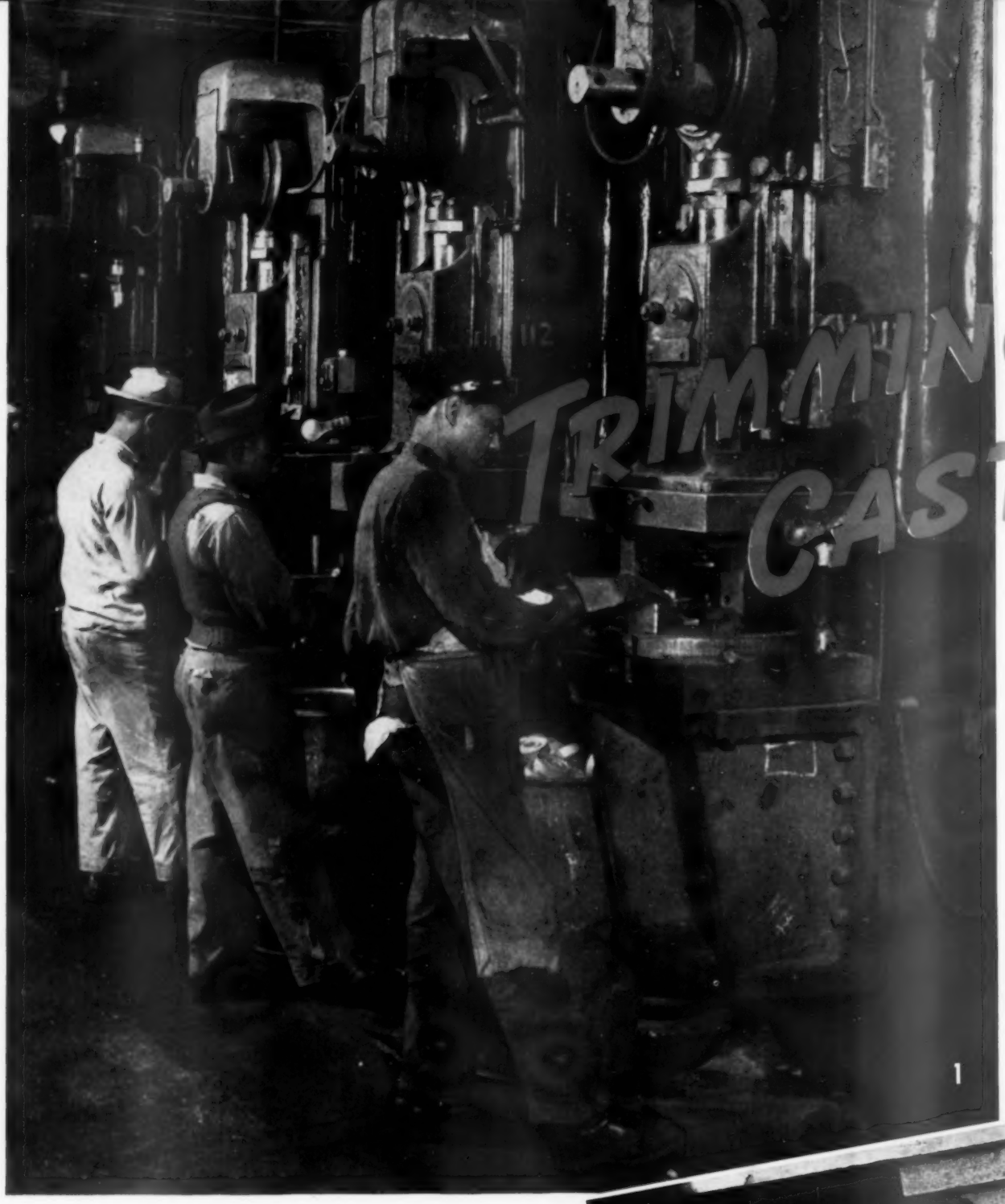


Fig. 1—Battery of mechanical presses used for trimming valve guide bushing castings and other small parts at production foundry of Ford Motor Co.

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

Fig. 2—Trim die and ejector (right foreground) used in trimming valve guide bushing. Fixture at left holding casting swings out from bed area for loading. For each stroke of the press a trimmed part is ejected and a rough part is inserted

PARTS

SUBSTANTIAL improvement in working conditions and increased output in the production foundry of Ford Motor Co., Dearborn, Mich., have been realized by installation of punch presses for trimming cast parts. This is believed to be one of the first instances in automobile manufacturing of a change from grinding to flash cutting of castings by the use of hydraulic or mechanical presses fitted with shearing dies. Parts now trimmed in presses range from small valve guide bushings to cylinder heads.

The development of presses used in cleaning operations began in 1943 when several steel castings were trimmed rather than ground in the Ford steel foundry. In the postwar period new dies have been designed and new parts marked for press finishing.

Decision to trim the cylinder head casting was reached only after careful study of the problem of designing special presses and dies which would clean but not damage the part. Because of the size of the part and savings which would be possible if the whole part could be trimmed in one stroke of a press, engi-

Fig. 3—Oil pump casting on locator die prior to trimming operation. These castings are trimmed at rate of 13 per minute

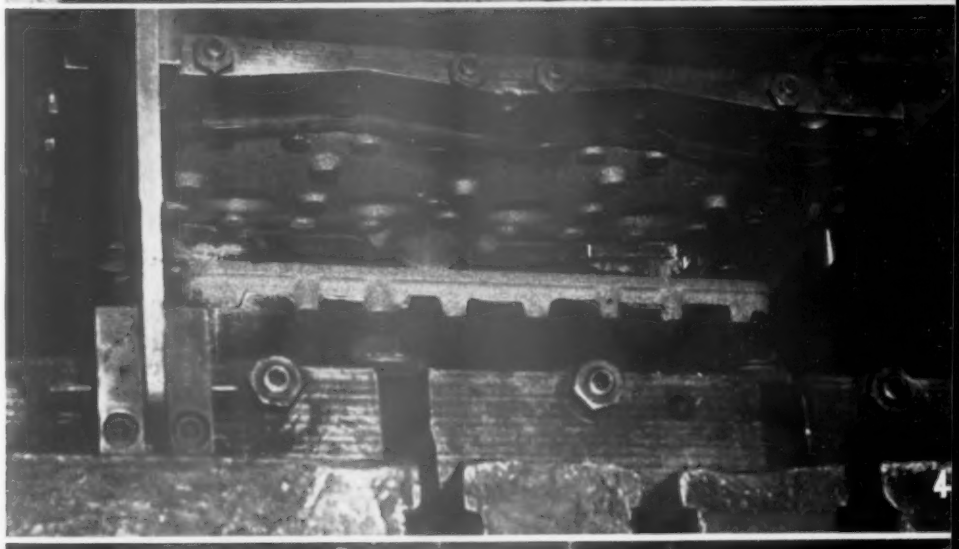


Fig. 4—Two cylinder heads in the press. Lower head has just been loaded and located and is ready for trimming. Top head is trimmed and ready for ejection. As the press opens, the trimmed head is delivered to an automatic fixture which ejects one finished part with each stroke of the press

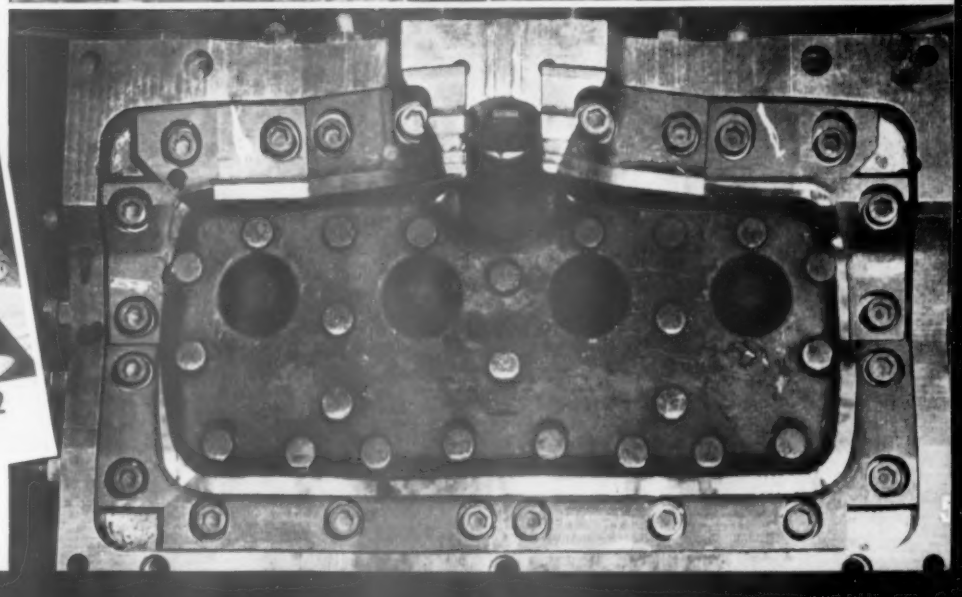


Fig. 5—Die retainer and replaceable trim sections, with the cylinder head casting in place

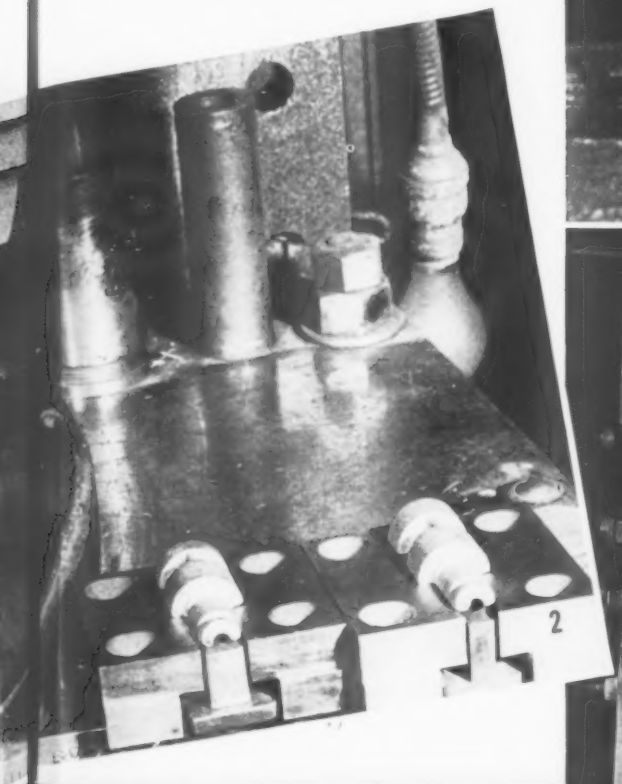
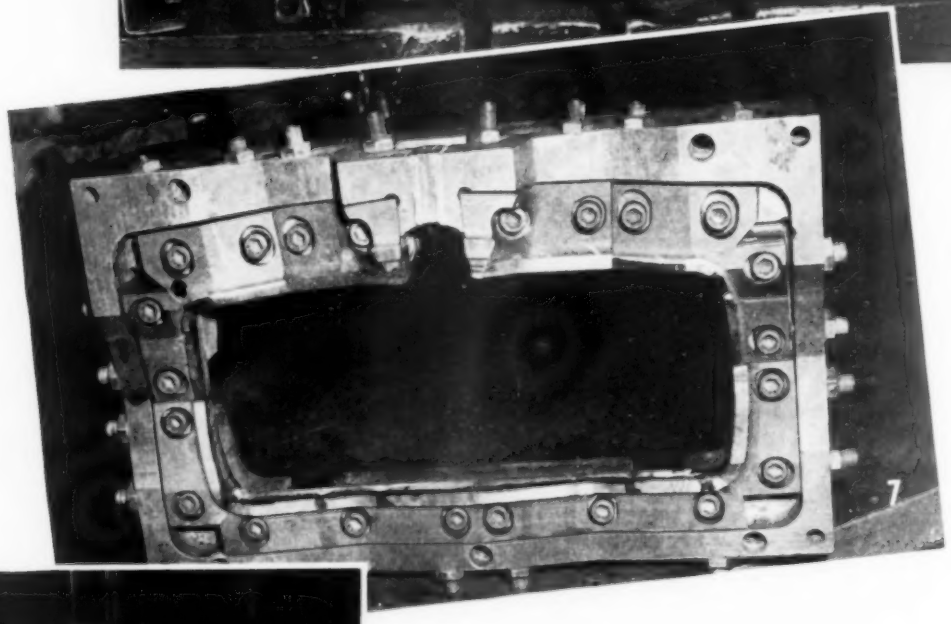
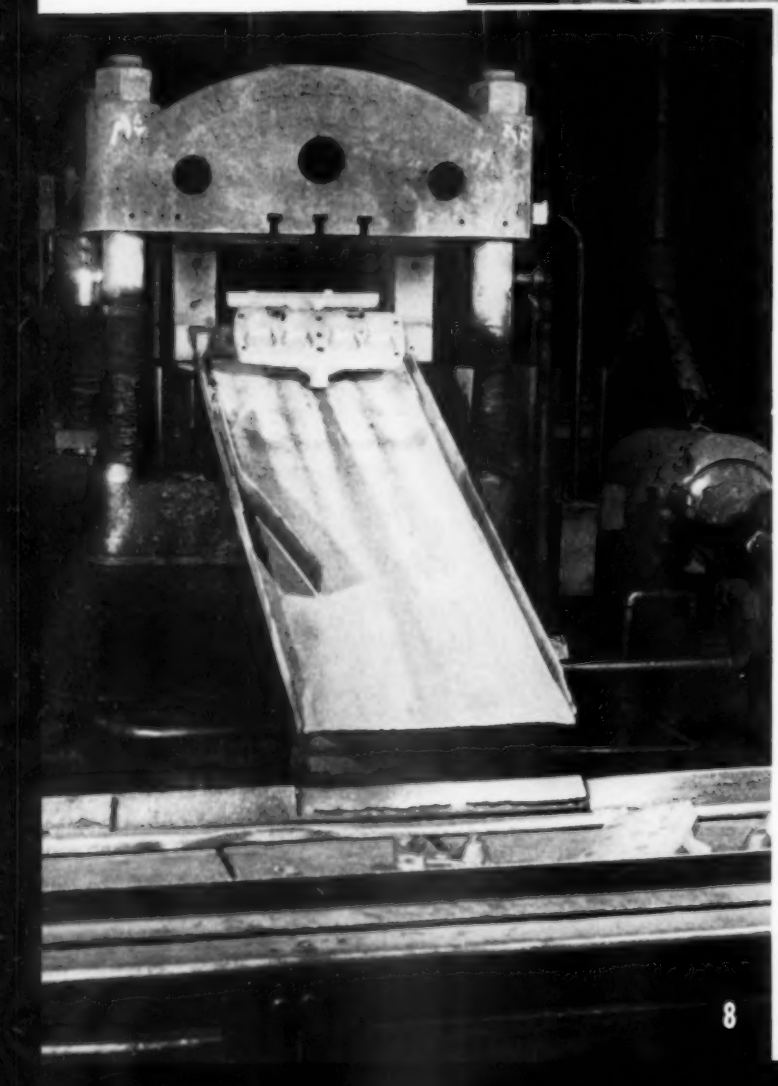


Fig. 6—Cylinder head casting in the locator section of the punch and die. Excess flash around some 36 in. of casting is removed to a tolerance of 1/16-in.

Fig. 7—Die retainer and replaceable trim sections without the cylinder head casting





neers designed a die which would trim the head castings of excess material and at the same time cushion the remainder of the part to prevent fracture of the shell.

In trimming small automotive parts, such as gear blanks and oil pump castings, production records of more than 8000 pieces per man in an 8-hour day have been reached, with all parts coming well within the acceptable dimensions.

In addition to eliminating the grinders and dust collectors, press trimming makes possible salvage of a considerable amount of metal for remelting which is otherwise lost. Automatic loading devices and new dies and presses have resulted in increased numbers of acceptable cast parts and better working conditions.

Fig. 8—Following the trimming operation, finished cylinder head castings are ejected from the 215-ton hydraulic press onto an inclined chute to be discharged upon a belt conveyor

Volumetric Determination of Tin in Copper-Base Alloys

By MILTON SHERMAN
Chief Chemist
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IMPORTANCE of tin in copper-base alloys calls for its accurate determination and the method used must be rapid without the loss of accuracy. The nitric acid digestion, gravimetric method is most commonly used for furnace control work. This procedure, besides being too long for control work, has many other well known shortcomings. At times there is incomplete recovery of the tin during filtration due to lack of coagulation of the metastannic acid. Any antimony and part of the phosphorus will be weighed with the tin oxide, thus yielding high results unless corrected for. If the iron in the alloy is over 0.25 per cent, results for tin are low. This makes the method practically useless for yellow brasses, nickel silvers and other high iron copper alloys.

Due to these difficulties this method has been eliminated by the ASTM as a procedure for the determination of tin in copper-base alloys. On the other hand, the reduction of tin by a metal and its titration by iodine or potassium iodate, which is the most accurate method and least subject to interference, is too long to be used as a furnace control method. In the volumetric method the time consuming operations are in removing the nitric acid used in dissolving the alloy and the long period of time needed for the quantitative reduction of the tin.

Recently[1], the author proposed a rapid volumetric method for tin where no nitric acid is introduced for solution of the alloy, and the time of reduction is reduced to a few minutes. The sample is dissolved in 30 per cent hydrogen peroxide and hydrochloric acid and the tin is separated from the copper by an ammonium hydroxide precipitation. This method for solution of copper-base alloys has been commonly used for a number of years in Germany and England. Reduction is accomplished (*Please turn to page* 240)

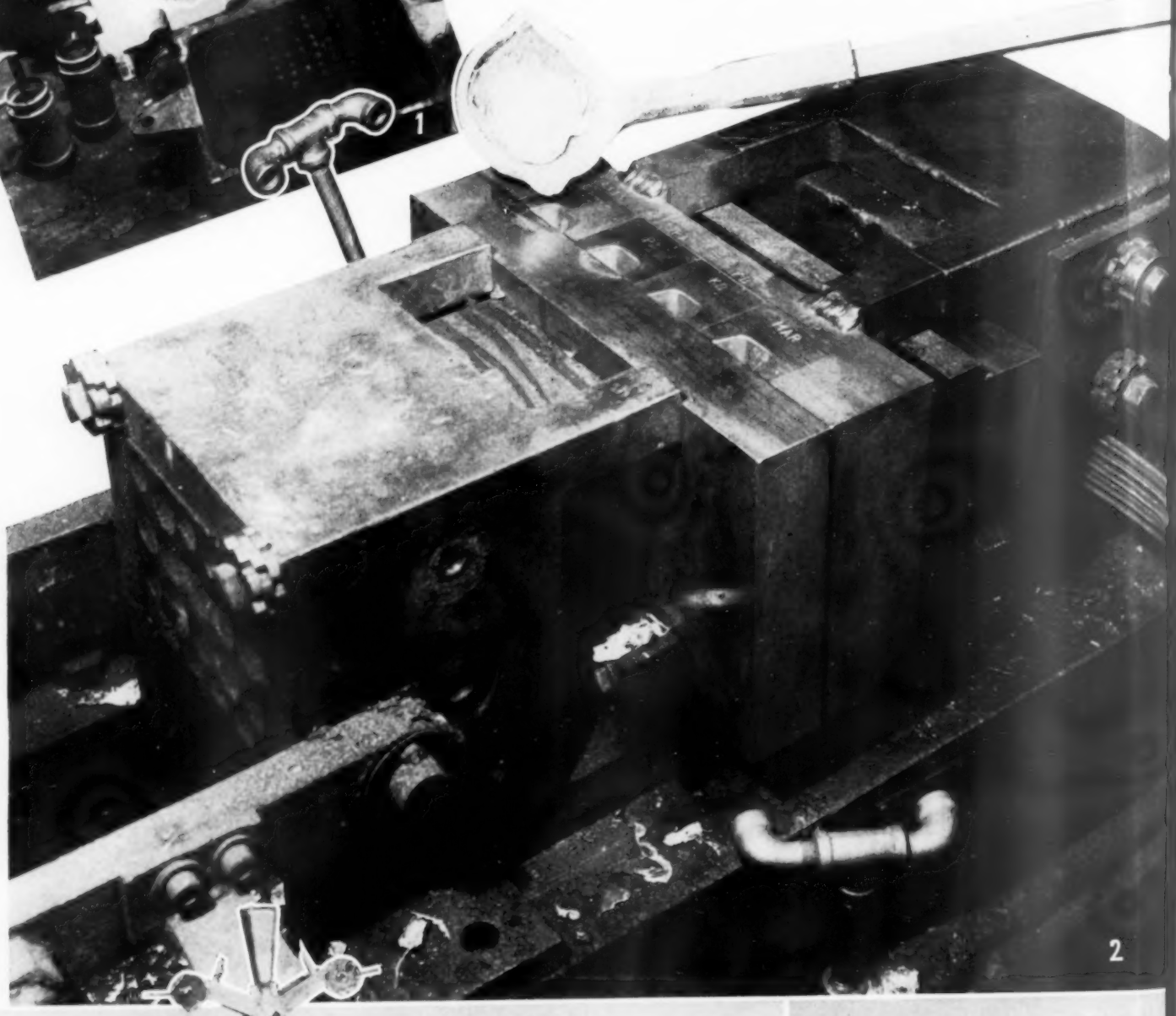
Volumetric Determination of Tin

Sample	% Tin Present	% Tin Found	% Deviation
Bureau of Standards			
No. 52b	8.00	7.98	.02
		7.99	.01
		8.00	.00
No. 62b	.96	.98	.02
		.96	.00
		.97	.01
No. 124a	4.82	4.81	.01
		4.82	.00
		4.82	.00
No. 124b	4.92	4.91	.01
		4.94	.02
		4.93	.01
No. 63a	9.76	9.76	.00
		9.76	.00
		9.74	.02
Ni-Ag Alloy	2.92*	2.92	.00
		2.91	.01
		2.91	.01

* Tin determined by ASTM method. Average of four runs.

Die Coatings

1



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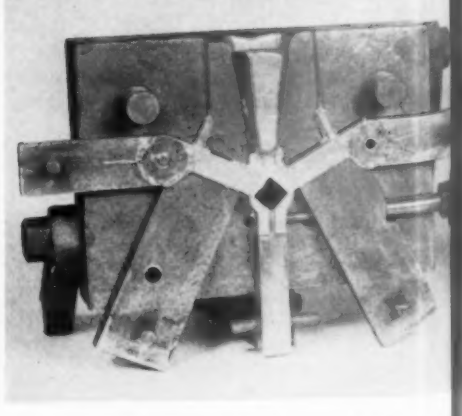


FOR COPPER-BASE ALLOY Permanent Mold Casting

By JAMES L. ERICKSON

NEARLY all foundrymen who cast copper-base alloys in permanent molds employ their own pet concoctions for die or mold coatings. Some permanent molders make use of as many as three or four different coatings.

Forty-five permanent molders who are specializing in casting copper-base alloys were questioned by the author in the United States, England, Denmark, Germany, France and Sweden, and 200 separate die coating formulas were recommended. Nearly as many reasons were offered to prove why each coating has merit over competing formulas, providing it is applied precisely according to the method prescribed by the individual recommending it.

Indeed, possession of the formula for a die coating is almost valueless unless its possessor also knows how to apply it to the die cavity surface; this is especially true when the chief function of the coating is that of an insulator, as opposed to those cases where the coating functions principally as a lubricant.

It is interesting to note how thoroughly the copper-base alloy permanent molders are convinced that the role played by their own die coating is of prime significance—almost without exception it is their candid opinion that selection, preparation, application and renewal of die coatings which they employ are among the most important aspects of their industry's "know-how." It is no wonder, therefore, that skilled die coaters are among the industry's most highly prized personnel. Properly applying the die coating to the die so as to achieve the best casting results is an *art* rather than a *science* and as such calls for expert craftsmanship.

Reasons for Using a Die Coating—While there is nearly universal disagreement on which of the many die coatings, if any, is the industry's panacea, there is less diversity of opinion as to why die coatings are of value and what are the functions of an acceptable coating.

A distinction is made on the basis of the function performed between a *permanent* type of die coating and a *semi-permanent* type. Each of these two types is generally employed to achieve different effects.

Certain permanent molders, however, claim that a proficient use of only one type of die coating will net almost any desired result, while others are equally convinced that in order to realize superior production and long die life it is absolutely essential in many instances to employ one of each type—one complementing the other's weak features—except when special provision is made in the design of the die to compensate for not employing one of the complementary types of coating.

A permanent molder's choice of the most important die coat functions is governed almost entirely by the die designing technique, the die material, and the casting alloy to which he subscribes. Thus while there are a host of different die coatings, and nearly as many reasons offered as to why each is best for its individual advocate, there is actually no denial on the part of one permanent molder that another's die coating is best for the latter's particular die designing and casting technique.

The most valued functions of a die coating are: (1) To serve as an insulating medium between the die or mold face and the molten casting alloy which fills the cavity, (2) to act (*Please turn to page* 180)

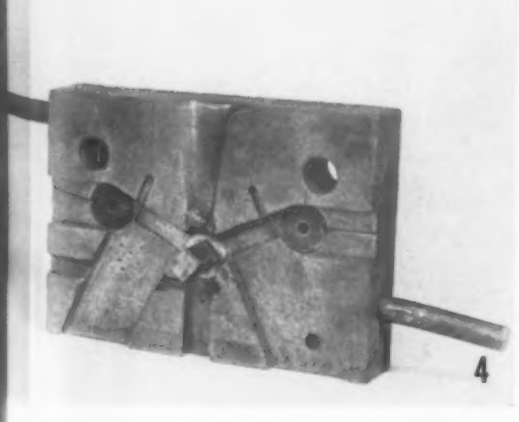


Fig. 1—Typical die of permanent mold casting machine with the permanent type of die coating applied

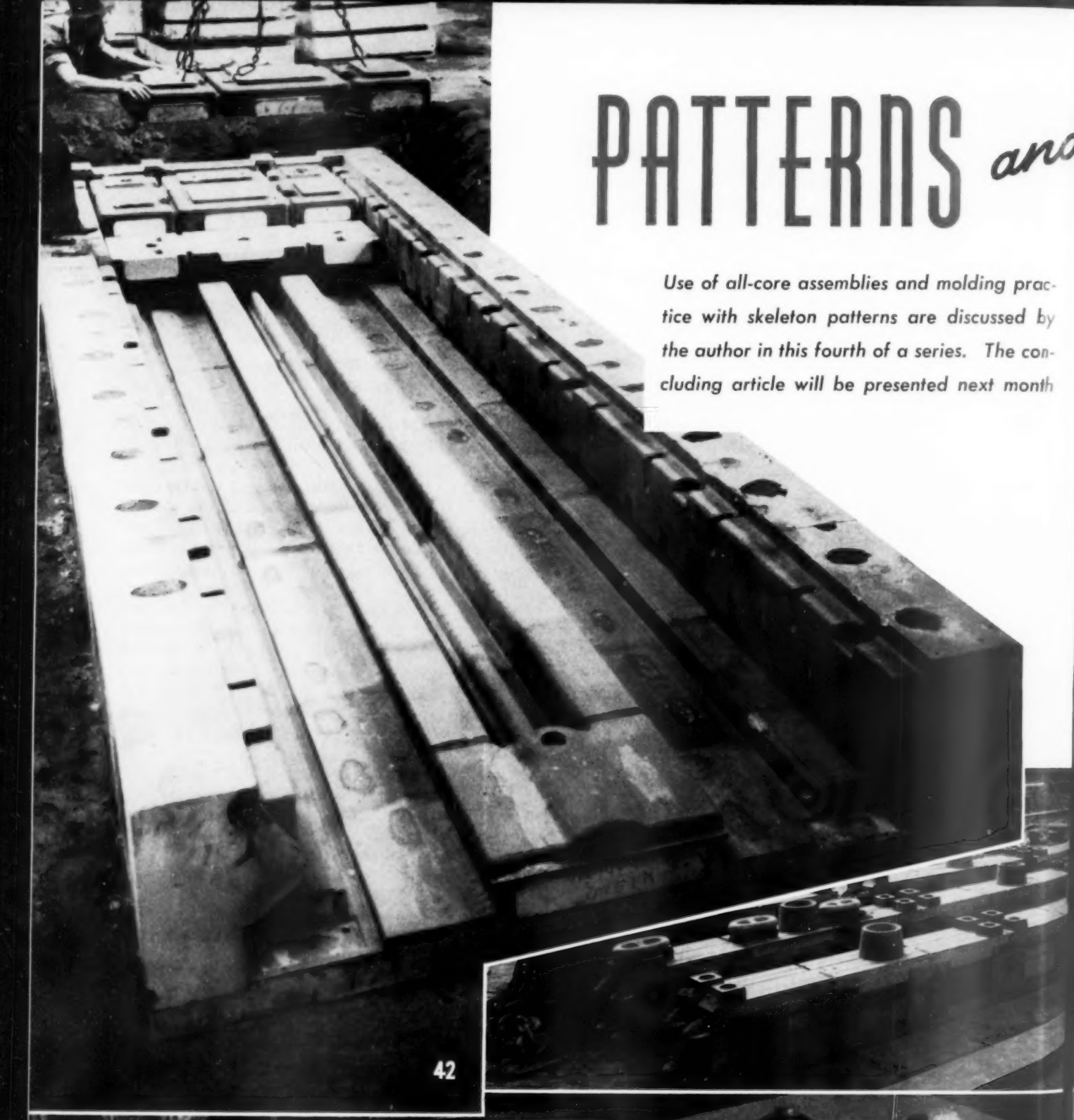
Fig. 2—Permanent mold machine for casting copper-base alloys. Built-in mechanism ejects casting with the aid of a single hand lever

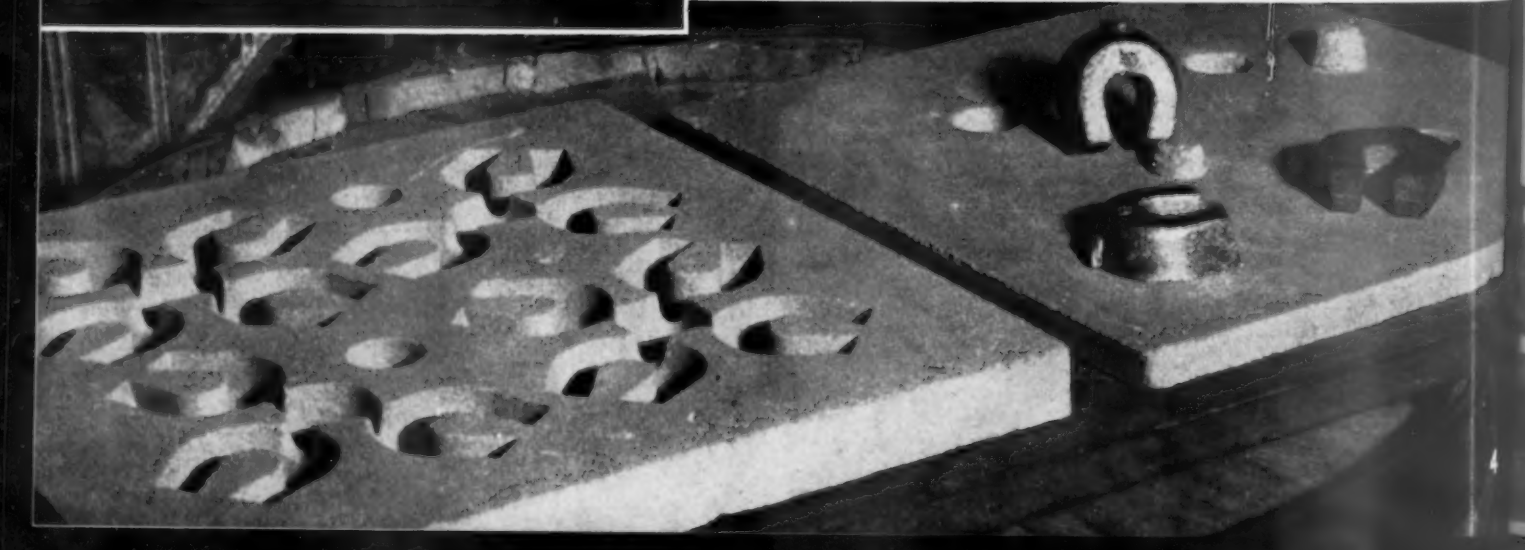
Fig. 3—British-made die for permanent mold casting of aluminum bronze, part illustrated. Die is dismantled ready for coating

Fig. 4—Same die as in Fig. 3 after assembly, with casting it makes shown in place

PATTERNS and M

Use of all-core assemblies and molding practice with skeleton patterns are discussed by the author in this fourth of a series. The concluding article will be presented next month





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A

MOLDING METHODS *for steel castings*

By JOHN HOWE HALL
Consultant
Swarthmore, Pa.

Fig. 42 — Assembly of core molds for production of a bed for a large machine tool

Fig. 43—Core molds shown in Fig. 46 as arranged on the floor for pouring. Steel channels give firm, level surface

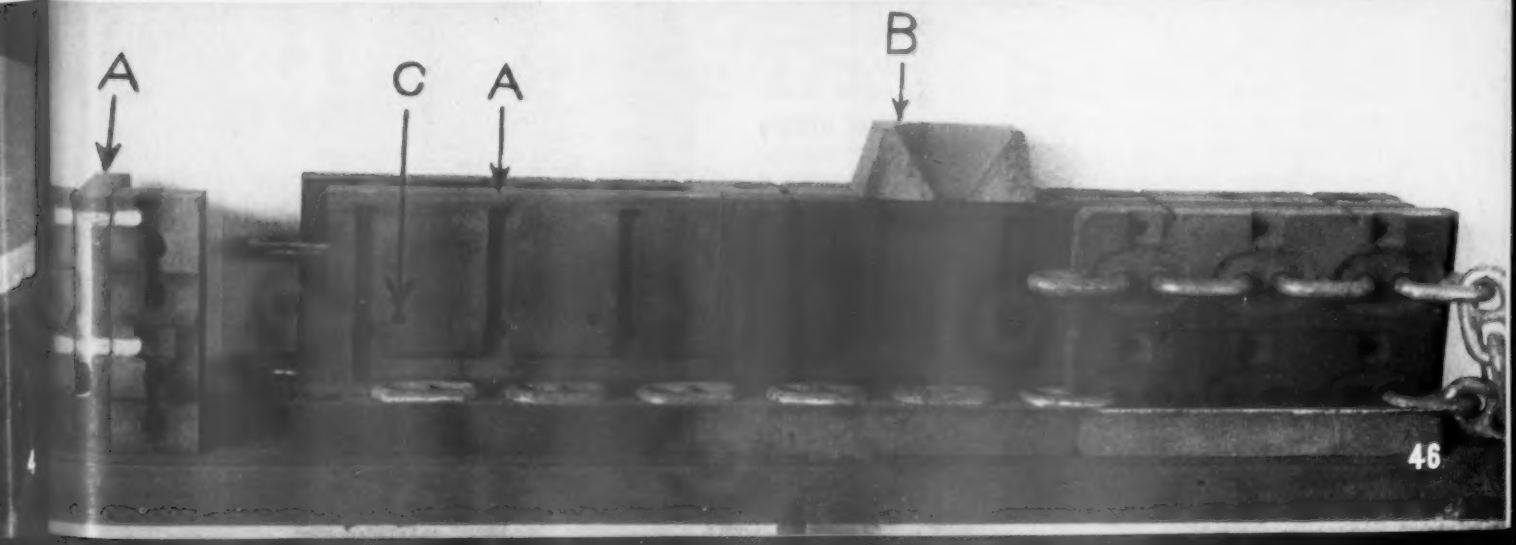
Fig. 44—Form used to set up core molds for a large railroad casting

Fig. 45—Dry sand cores used to form molds. Two projections on cope at right fit into recesses in drag at left to provide proper register

Fig. 46 — Sections of core molds specially arranged to show method of assembly

IN CERTAIN cases, both fully dried and partially dried cores offer so much resistance to the contraction of the casting that they cannot be successfully used. In that case, green sand cores that have not been dried at all are often used, since green sand is more collapsible than any sand mixture used after drying. Arbors would usually be unsatisfactory in such cores, because they would resist the contraction of the steel, and often could not be removed from the casting after it had cooled. To make it possible to handle green sand cores, they are often made in parts, a comparatively thin dry-sand "biscuit" core being made separately and set in the box in which the green sand part is rammed. The completed core can then be removed from the box and handled by taking hold only of the dry sand base, or occasionally by means of lifting hooks attached to rods in the dry sand portion. At times, instead of making green sand cores in separate boxes it is advantageous to ram them against the pattern itself, with the dry sand biscuit first put in place, and handle them in the same manner as regular draw-backs.

Large heavy cores are often dried lying on one of the sides that is to be in a vertical position in the mold. In that case, it is necessary to turn the



core over before it can be lifted and placed in the mold. This is usually accomplished by sliding it off the drying plate into a heap of loose sand on which it can be rolled over without damaging the corners or other projecting portions. When no lifting hooks can be used to handle a big core, it may be necessary to slip slings of rope or belting under it, and carry it to the mold as elephants are unloaded from ships.

Such slings can usually be pulled out from under the core after it has been placed in position in the mold. Usually, however, lifting hooks slipped into the rings of the rods built into the core, are depended upon. When the hook-holes at the ends of these rods are located on a side of the core which is to be in contact with the liquid steel, they must be filled up with strongly bonded sand and smoothed off with the molder's trowel. As a rule, it is necessary to dry these patches with a foundry torch, but some concerns have developed special materials that can be used with only a short air drying.

Use Cores To Make Mold

A logical development from the use of cores to form parts of a mold was the adoption of the practice of making the outline of the casting in two or more cores, set together to form a complete mold. Usually two cores, forming cope and drag, are employed. These are quite similar to snap-flask or strip-flask molds which, however, are almost always poured without being dried. As will be described later, it is usually necessary to use jackets on green sand molds of this type to prevent the mold from being burst open by the pressure of the fluid steel. Pairs of cores forming a cope and drag, each made in a separate box, adequately rodded and dried in the oven, are strong enough not to need the support of jackets; a weight is placed on top of the cope core to hold it down, of course.

To avoid shifts in mating up the cope and drag cores, two or more projecting conical masses of sand are formed in either one, engaging similarly shaped recesses in the other. An example of this practice is shown in Fig. 45. An alternative method is to form recesses in both cope and drag cores, in the form of either truncated cones or truncated pyramids. Before closing the mold, metal blocks or small hard-baked cores that fit the recesses closely are dropped into those in the drag, and serve to guide the cope into proper position.

Though there is a certain saving effected by the elimination of the jackets ordinarily used with snap or strip flask molds, this advantage of core molds is as a rule more than offset by the fact that more expensive sand mixtures are used for dry sand cores than for green sand work, and by the cost of drying the cores. There is also considerable expense involved in the handling labor and supervision required to keep track of a large number of separate pieces that must be mated up and assembled for pouring.

A modification of the use of cores in pairs to form a mold is illustrated in Figs. 43 and 46, the latter showing how the cores are set together to shape the castings, the former being a view of a number of sets of cores set up on a firm foundation and tied together, ready for pouring. As will be seen in Fig. 46, chain links previously cast in separate molds are inserted at two levels in spaces provided in the cores to receive them. Metal enters the central core at *B*, flows along the gate at the bottom, and up the ingates marked *A*, which admit it first into the openings forming the lower set of connecting links, then into the upper set. The holes marked *C* are provided to accommodate the bolts that tie the assembly together.

When cement-bonded sand is used in the foundry, the molds must be completely air dried before closing, and the copes and drags dry far better if handled separately. Cement sand also is very hard to knock out of flask, which makes it undesirable to use ordinary molding methods. In cement sand practice, therefore, a great number of jobs are made up in two or more coreboxes, often of quite large size. As mentioned elsewhere, air-dried, cement-bonded sand cores are very hard to rub to a fit, unlike ordinary dry sand cores that can be easily trued up with a rasp, a piece of fire brick or a fragment of broken grinding wheel. It is therefore desirable that cement-bonded cores have a perfectly flat surface, so that the joints between adjacent cores will be nearly perfect. To ensure such flat surfaces, these large cement-bonded sand cores are air dried on accurately machined, heavy steel core plates. To secure proper alignment and avoid shifts, steel spools can be set in the sand of either the cope or drag core, engaging pins in the matching core, both spools and pins being properly located by seats in the core boxes provided for the purpose.

Instead of making only a drag and a cope, a "stack" of cores, with a down-gate that extends the full depth of the stack, may be built up, clamped together and poured as a unit. Such an arrangement may be adopted simply for the purpose of increasing the weight poured on a given amount of floor space. The stack is then merely a series of independent molds, made up of a number of drags and copes set one above the other. Green sand molds are not often stacked in this manner, because the pressure of the

fluid steel tends to swell the lower molds and thus make overweight castings at the bottom of the stack. Dry sand or cement-bonded sand cores, however, are very satisfactory for this practice. Fig. 51 shows a stack of cores and the castings produced in a similar stack, still attached to the down-gate, while Fig. 45 illustrates the cores used for making small horseshoe-shaped pieces in stacks, and three of the castings so made.

Stacked cores are also utilized to produce castings of very irregular outline, some of which would be hard to mold in other ways. Complicated crankshafts, for instance, have been successfully produced in this manner, as many as four castings being formed in each stack of cores. They are poured in a vertical position, and the joints between the cores so located that each core shapes a part of the casting, the pattern for which will draw from either the top or the bottom of the core. The down-gate usually is carried to the bottom of the stack, and thence to each casting through sprues in the lowest core.

To build a large mold out of a number of cores, made in suitable boxes, dried separately and assembled, seems at first sight an ideal solution for many of the problems the steel foundryman is confronted with. An example of making up a mold in this manner is given in Fig. 42, showing a partially assembled mold for a lathe bed or similar casting, with the upper portion of one of the internal cores being lowered into place. The cover cores that serve as cope for this piece are shown piled up in the background.

Except in special cases, the economy of the method is, to say the least, more than doubtful. The cost of making a complete pattern and the necessary core-boxes for any given casting is usually not much different from that of (*Please turn to page* 210)

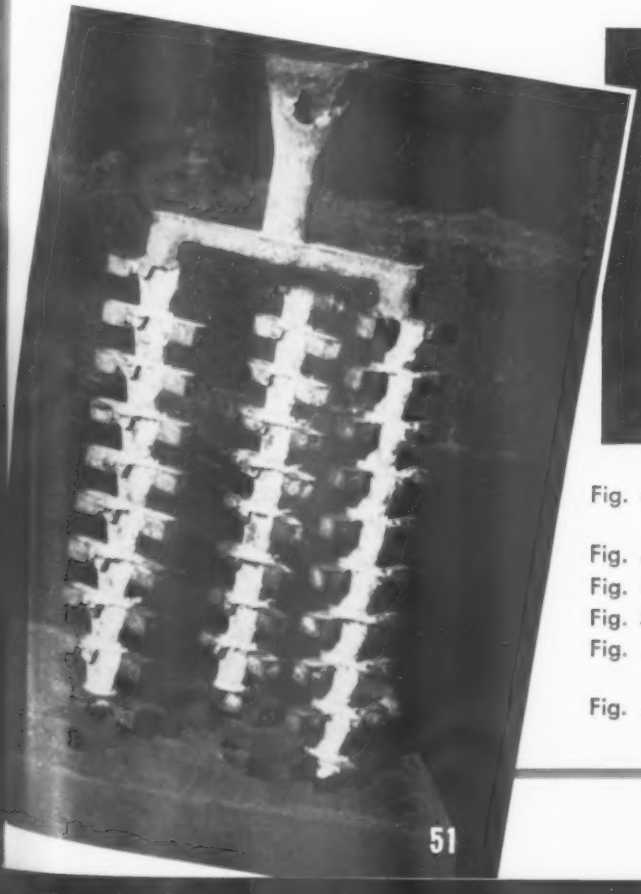


Fig. 47—Split pattern shell for pump casing showing removable blocks to permit ramming of the sand

Fig. 48—Method of bedding-in drag half of pattern shown in Fig. 49

Fig. 49—Cope half in place over completed inner core

Fig. 50—Inner core after removal of cope pattern

Fig. 51—Stack of cores and the castings produced in a similar mold shown attached to the down-gate

Fig. 52—Pattern for part of a hydraulic turbine installation with the section on the left in full skeleton

Questions AND Answers

Has Trouble With Cupola Blast

Q.—We melt 18 to 20 tons of iron each day in 2 to 2¼ hr in a cupola lined to 51-in. Air is supplied by a single-stage centrifugal compressor operated by a 60 hp motor. Compressor is regulated by an electrically controlled air-weight device. Coke bed is 48 in. above the tuyeres of which there are six 12 x 5 in. Coke splits are 300 lb with 2000 lb metal. At the start of melting the indicator shows 400 lb of air per minute which drops to 300 lb in a minute or two, and within one-half hour the indicator registers close to zero with the pressure at 16 oz. Actually we do get some air since we pull down 20 tons of iron in 2 hr, most metal being at a satisfactory temperature. However, we have no control on the compressor; the butterfly valve in the delivery tube is wide open and we find the motor takes only about half the amperage required under full load. All electrical connections have been checked and the compressor and air duct have been dismantled and reassembled without revealing any defect. When the cupola is empty the compressor responds beautifully to deliver any desired volume of air. We also have trouble with chilled iron at the start as indicated by a wedge specimen, and use ferrosilicon additions to overcome that trouble. Cupola is lighted at 1 p.m., iron charged at 2 p.m., and compressor started at 3 p.m. Iron flows at the spout seven minutes later. We are using 300 lb pig iron and 1700 lb scrap. Our sulphur is much too high as indicated in the typical analysis of our stoveplate which shows 2.45 Si, 0.59 P, 0.145 S, and 3.26 TC. We attribute the high sulphur to the coke, but we have only one source of supply so cannot make any change along that line. We use fused soda ash and limestone in the cupola. Iron and slag flow into a mixing ladle and soda ash is added to that.

A.—From the description you have given, it is our opinion that your trouble is due to the poor quality coke making such a compact mass that the wind has difficulty in penetrating it. While you mention that the pressure is 16 oz, we believe that a careful check and cleaning of the pressure indicating unit will show that it is considerably higher, and probably close to the maximum pressure developed by the blower. However, under that condition the volume or weight of air is decreased as indicated by the power load dropping to about one-half.

Our suggestion is to try reducing the weight of iron on the coke by splitting the present splits and burden in two; that is, use 150 lb coke and 1000 lb iron. Possibly it might be better to follow the system advocated by Reese of maintaining a standard coke charge for the diameter of the cupola which in your case would be 185 lb, and then placing the iron in whatever ratio is desired. For the 7 to 1 ratio you now employ the iron charge would weigh 1295 lb or, in round numbers, say 1300 lb.

In these days with poor quality coke, the sulphur tends to run much higher in the iron. However, we believe that you can lower your 0.145 per cent appreciably by a change of practice. Instead of permitting iron and slag to run into the mixing ladle, install a front slagging spout as shown on pages 44 and 45 of the *Handbook of Cupola Operation*. Then only iron will flow into the mixing ladle where it can be effectively treated with the soda ash. Addition of soda ash where slag is present tends to thin out the slag without removing much sulphur. With clean iron in the ladle the addition of 5 to 10 lb soda ash per ton of iron should bring the sulphur down to around 0.100 per cent. This will mean an addition of the specific amount every 6 minutes at the point where the iron enters the ladle. Excess or spent material is skimmed off by tipping the ladle back before addition of new reagent.

As far as the chill in the iron is concerned, we wonder whether you are not placing too much concern on the indication of the wedge bar. The important consideration is whether you have found chilled edges or hard castings when the wedge bar shows ⅛-in. chill, etc. In other words, there should be a tie-in between results on castings and indications on the chill bar. You do not mention the size of the wedge bar but, for example, if it is 1 x 3 x 4 in., the thickness ⅜-in. from the feather edge is about ⅛-in. Since the cooling rate of the wedge tip would be higher than for a uniform section, we believe that you should have no trouble with the castings, and it might be well to determine that point definitely.

Make Machinable Light Castings

Q.—We intend to operate a gray iron foundry in South Africa soon, and would like to have information on use of light cast iron and steel scrap in the production of light iron castings such as switch boxes, small water pumps, etc. Pig iron is in very short supply. We will use a cupola lined to 20 in., and would like to know how to increase both carbon and silicon in the iron as in our opinion those elements are the ones we have to concentrate on to get good machinable castings.

A.—Although it is preferable to use at least a small amount of pig iron in the charge, it is possible to secure machinable castings with an all-scrap mixture by careful control of the melting conditions, and additions of silicon and manganese to bring them within the desired range. Silicon additions may be made to the charge by use of silvery pig, ferrosilicon briquets or lump ferrosilicon, although with the latter the recovery is less.

However, we believe that you will obtain better results by adding part of the silicon to the charge and 0.50 to 0.75 per cent in the ladle. Instead of ferrosilicon additions in the ladle, you might use any of the several graphitizing inoculants on the market. Manganese additions are made to the charge by use

of ferromanganese briquets or lump ferromanganese. Silicon and manganese additions made to the charge should be placed on the coke in the center of the cupola. The amount will have to be determined from the composition of the ingoing metal charge, and the melting loss for your particular cupola. Usually the silicon loss is figured as 10 per cent and the manganese as 20 per cent.

To obtain high total carbon it will be advisable to use a somewhat deeper bed of coke in the cupola and to increase the weight of the coke splits. Use of pitch coke, petroleum coke (and probably gas house coke) in combination with hard by-product coke will aid in obtaining a higher carbon pickup in the cupola. Also, the longer the coke can remain in contact with the coke in the reservoir, the greater the pickup. However, for uniform results, the tapping and botting up should be maintained on a definite schedule. High melting temperature also increases carbon pickup. Increase in total carbon content of cupola iron can be obtained by use of lump graphite or scrap graphite electrodes in the bed coke.

Changes May Eliminate Trouble

Q.—In our foundry in India we are using a cupola lined to 42 in. which melts 3½ tons per hr for the first two hours and then drops to 3 tons. We are at a loss to understand the cause, but it might be due to the low quality coke containing 20 to 22 per cent ash. We require about 20 to 22 tons of castings a day; largest being 300 lb, but most ranging from 5 to 15 lb. We are thinking of putting in a new hotblast cupola. Can you supply us full details on such a unit which will yield 5 to 6 tons per hr, and give us its advantages? How long will such a cupola run; does it require a special stove to heat the chamber; does it require a pressure type or fan blower? If the cupola will run continuously for 7 to 8 hr, we will only need three tons per hr. Can you tell us exactly what is meant by a "continuous cupola"? Does it run from morning until evening or doesn't it require tapping all the metal continuously getting into the reservoir?

A.—In this country a cupola lined to 42 in. will melt at an average rate of 5½ tons per hr, and it appears from your description that you are having trouble with bridging as well as slow melting. Undoubtedly, your high-ash coke is responsible for both, and possibly some changes in practice might improve conditions. Since you do not give any information on the weights of coke splits, iron charges and limestone, amount of air, etc., we can only make suggestions. Your high-ash coke will require an increase in limestone, say about 10 lb. per ton of iron. It also may be well for you to see that your limestone does not contain over 3 per cent impurities. If your slag is viscous and gummy, try additions of silica sand, soda ash or fluorspar to thin it out.

We suggest that you cut down the sizes of your coke and iron charges. Try a coke charge of 100 lb as a standard and then vary the weight of iron in ratios of 1 to 6 to 10 until you find the one which gives you best results as to melting rate, metal temperature, etc. As a start it might be well to begin with your present coke-to-iron ratio, and then vary it up or down until the most satisfactory results are obtained. Use 1 lb limestone to 4 lb coke, or 25 lb to the 100-lb coke split, and use the same amount on top of the bed before charging any iron. Coke bed should be from 42 to 48 in. above the tops of the tuyeres, and the air supply should be 3100 cfm.

We cannot supply details of construction on hotblast cupolas, but that information can be secured from the makers. There are three methods in use in this country. In one the exhaust gases are taken from the cupola at a point beneath the charging door, and conducted to a heat exchanger unit where they are burned to heat the incoming air to the cupola. In another type an externally fired heat exchanger is employed to preheat the blast, while in the third the blast to the cupola passes through hollow cast iron chambers located in the wall of the cupola. Main advantage of the preheated cupola blast is that less coke is required to melt a given quantity of iron.

As far as length of time a cupola is in operation, it is quite common for cupolas in this country to melt 8 hr. per day, and some are in blast 16 to 18 and even 24 hr. These are in production foundries where iron is poured continuously during the time the cupola is in operation. By a "continuous" cupola is meant one from which the metal flows continuously without botting up except possibly for extremely short periods. The taphole is of such size that the metal flows out at the same rate it is melted. A large mixing ladle is interposed between the spout and the pouring ladles to eliminate necessity of botting up, to fill pouring ladles easier, and to hold the iron during the periods when pouring ladles are not catching in.

GANGWAY!

By J. A. PATTERSON

"I'm so nervous this morning I haven't even got this chipping hose hooked up!"

Questions AND Answers

Permanent Molds for Soil Pipe

Q.—We are interested in making aluminum soil pipe in this community, and would like to investigate the field of permanent and semi-permanent molds. Can you give us any information or possible sources of information along that line?

A.—We are somewhat dubious on the use of the permanent mold process for the production of aluminum (or cast iron) soil pipe by static casting, and wonder if you meant centrifugal casting. Even with the centrifugal process we believe that you might have trouble in obtaining a smooth interior in the aluminum pipe. A pipe 5 ft long of comparatively thin wall section is difficult to cast in sand when the alloy has a low heat capacity such as aluminum. When a metal mold, which abstracts heat more rapidly than sand is employed, the trouble increases.

To obtain the highest yield from a given quantity of metal, it appears to us that it would be advisable to make two pipes in a mold fed from one runner with either long slot gates into the cavities, or a large number of branch gates. To eliminate the long drop of metal with its possible aspiration of air and turbulence, it also would be wise to mount the mold in a horizontal plane on trunnions so that it could be tilted; pouring the metal slightly uphill, and changing the angle as filling proceeds, and when the mold is full the head end is raised to exert additional static pressure.

Data on Melting Aluminum Bronze

Q.—We expect to melt some SAE 68B aluminum bronze in a direct gas-fired furnace. We have been told that it is impossible to melt a high aluminum content alloy in this type of furnace. Can you tell us whether such melting is feasible and what precautions should be observed? Also can you tell us whether this alloy is suitable for bearings in corrosive atmospheres?

A.—We presume that by a direct fired furnace, you are referring to what popularly is known as an "open-flame" unit in which the products of combustion come in contact with the material being melted. While many believe that such furnaces are not suitable for melting of aluminum, others have and still are using them satisfactorily. Essential feature in the operation of the open-flame furnace in the melting of any alloy whether copper or aluminum-base, is to see that combustion of oil or gas is as nearly perfect as can be obtained. If the atmosphere in the furnace is highly oxidizing, the alloy will be oxidized with high losses due to drossing, and if the atmosphere is reducing the alloy will be gassed.

The Copper Development Association (Great Britain) states in a book entitled *Aluminum Bronze* that "equally satisfactory results can be obtained from coke, gas or oil-fired furnaces of the pit or tilting types, from reverberatory furnaces, or from carbon arc rocking furnaces." Since the open-flame furnace is a reverberatory type, it apparently can be used although we do not know of it being used for that purpose. Most essential point in melting aluminum bronze is rapid melting to prevent gas absorption. Also the alloy should not be stirred and skimmed any more than necessary to prevent the aluminum oxide skin from being carried into the metal to form inclusions.

Information in the Society of Automotive Engineers' *Handbook* states that 68B alloy has good strength, good corrosion resistance, and a low coefficient of friction against steel.

Wet Ladles Cause Casting Holes

Q.—We are sending a specimen of a filter plate 1¼ x 36 x 36 in. which was scrapped due to the numerous holes permeating the section. Composition shows 2.64 per cent Si, 3.24 per cent TC, 0.68 per cent Mn, 0.131 per cent S, and 0.336 per cent P. Iron charge is 200 lb pig, 700 lb iron scrap, and 100 lb steel scrap. Coke splits are 140 lb with 20 lb limestone. Iron temperature is 2780°F; melting rate 7½ tons per hr with blast of 240 lb per minute at 13 oz. Iron is inoculated with 0.5 per cent 85 per cent ferrosilicon. Coke bed is 40 in. above tuyeres. Scrap such as this occurs very seldom and at random in the shop. On a floor of 20 castings only three or four will be scrapped, and this will not repeat itself on this floor for some time.

A.—Inspection of the specimen submitted shows it to be permeated with holes with nice clean surfaces, even on those which reach just under the surface. To us that is an indication that they were caused by gas picked up previous to pouring into the mold. If the holes were caused by moisture in the sand they would be dull and discolored; or if caused by organic material in the sand, the holes usually are bright and shiny from a carbon deposit. We suspect that the cause of the holes is ladles which are not thoroughly dried since the trouble is only encountered sporadically. If the difficulty arose from melting, we believe that the trouble would be with you all the time unless changes were being made in iron and coke ratios, amount of air being used, etc.

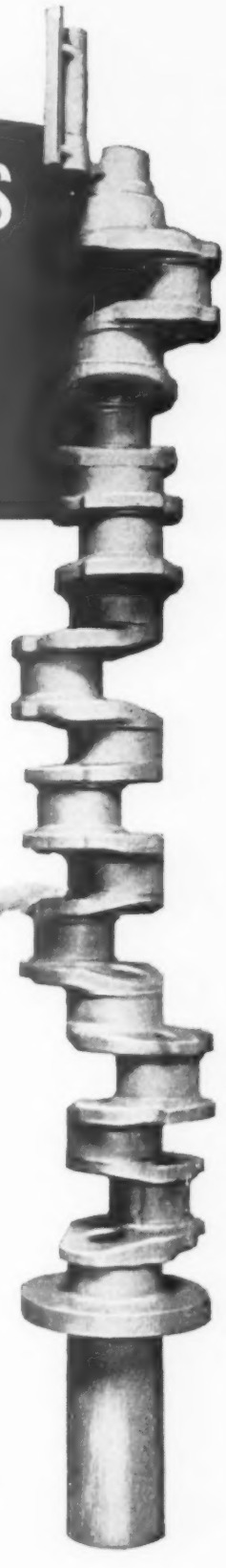
Is Going To Rebuild a Cupola

Q.—We are going to rebuild an old cupola and line it down to 27 in. diam. We plan on using four tuyeres, have a new turbo blower of 1000 cu ft per minute capacity available, and want the well to hold about 1000 lb of iron. Can you give us information on the size of the tuyeres, volume of air and its pressure, height of the bed, etc.?

A.—Suggested total tuyere area for a cupola lined to 27 in. is 121 sq in., and with four tuyeres each would have an area of 30 sq in. Since the preferable height for tuyeres is from 4 to 6 in., each one could be 4½ x 7 in., or 5 x 6 in. Available information indicates that a 27-in. cupola should be supplied with 1290 cu ft of air per minute at 12 oz, and preferably the blower should be able to supply 1430 cu ft at 16 oz dicharge pressure. Hence, the blower you mention

(Concluded on page 98)

HEAVY DUTY CRANKSHAFTS
cast in High Test
NICKEL ALLOY IRON



Crankshafts ranging from 800 to 4000 pounds in weight, and from 6 to 18 feet in length . . . for large Diesel engines in marine, locomotive, and stationary power plants . . . are now produced commercially by Pacific Car & Foundry Company's efficient new casting method.

The photograph shows an unmachined 8-throw unit that weighs 2105 pounds. It was cast in high strength nickel-molybdenum gray iron at Pacific's foundry in Renton, Washington.

This nickel alloy iron, produced as an inoculated iron in the basic electric furnace, consistently meets strength specifications of 60,000 to 75,000 p.s.i.

Each shaft is stress-relief annealed, and x-rayed to detect possible internal defects.

These nickel-molybdenum cast iron crankshafts provide:

- **Low Notch Sensitivity**
- **Excellent Vibration Damping**
- **High Resistance to Fatigue**

Avoidance of expensive dies and forging equipment, the use of cores to eliminate unnecessary metal, and the fact that castings require less machine tool time . . . point to the economy of using nickel alloy irons.

Heavy duty crankshafts indicate the wide scope of applications for high strength nickel alloy cast irons. Our casting specialists will be glad to consult with you and suggest where nickel cast irons may be useful to you. Write us today.

This high test nickel iron crankshaft is cast in a mold set horizontally, and tilted slightly while pouring. Mounted in specially designed trunions, the mold is rotated 90° to the vertical position for cooling. This provides better feeding, improved directional solidification, and thus, sound castings.

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Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N.Y.

Questions AND Answers

(*Concluded from page* 96)

is too small for proper melting. Coke height may range from 36 to 42 in. above the tuyeres, and will have to be determined experimentally. Coke splits in the cupola should weigh about 45 lb, and the iron-to-coke ratio based upon that figure. This means that with an 8-to-1 ratio you would use 360 lb iron, and with a 6-to-1 ratio the iron weight would be 270 lb.

Since you want the well of the cupola to hold 1000 lb iron, and the coke will occupy 60 per cent of the volume, the well depth may be computed from the cross-sectional area (3.97 sq ft) and the volume of 1000 lb of iron (2.2 cu ft). These give a metal depth (2.2 ÷ 3.97) of .554 ft, which is 40 per cent of the total depth (.554 ÷ .40) of 1.39 ft, or nearly 17 in. Bottoms of the tuyeres should be at least 4 in. above that height to prevent possibility of iron running into them.

Selects Small Crucible Furnace

Q.—We operate a pattern shop and are interested in starting our own foundry for production of metal patterns, matchplates, and possibly sample castings from the patterns. We would like to use a crucible holding 30 to 35 lb, and fired by coke or oil. We do not know anything about a furnace best suited for our purpose, but of course, would like to obtain the most reasonably priced and practical unit.

A.—Selection of a melting unit for your purpose should include a consideration of the advantages and disadvantages as well as first cost. Laing and Rolfe in *Non-Ferrous Foundry Practice* point out that advantages of the coke-fired pit furnace include simplicity of construction, low maintenance and depreciation charges, versatility in melting a large number of small amounts of different alloys in different crucibles without risk of contamination as when using one fixed crucible. Chief drawbacks are high labor charges, high coke-to-metal ratio, necessity of a high chimney stack, comparatively slow melting rate with increased risk of gas pickup, and high crucible costs due to extra wear and tear in lifting in and out. Use of forced draft instead of natural draft decreases melting time, and lowers coke-to-metal ratio.

Coke-fired tilting furnaces have a much greater thermal efficiency and melt more rapidly. Crucible life is higher due to being fixed in the furnace, but risk of contamination is higher due to using the same crucible for different alloys, and it is a long and costly job to change crucibles.

While with oil-fired furnaces a fuel storage tank and pipe line increases initial installation cost, fuel storage room and handling costs are reduced to a minimum. Time for preliminary heating of the crucible and in actual melting is short. Outstanding advantages are close control of temperature and furnace atmosphere, which can be varied from oxidizing to reducing by adjusting the burners.

Make Sashweights in Metal Molds

Q.—At present we are making sashweights, and wonder if it is possible to cast them in permanent molds. We have experimented to some extent, making our own mold with two cavities, but find that the castings sometimes burn in and also fin. We would appreciate any information you have on thickness of mold, suitable mold wash, etc. Would water cooling help?

A.—There appears to be no reason why sashweights cannot be made in metal molds, but whether or not it is economical must be determined by comparing actual costs of sand and metal mold processes. We believe that the burning-in trouble can be overcome by use of a mold wash on the faces of the cavities. Mold wash usually is composed of a refractory fireclay suspended in water with the addition of a small amount of water glass (silicate of soda). It should be thin in consistency, and applied in several thin coats rather than one heavier coat. Mold should be heated to around 200°F, and coating applied by brushing or spraying.

Fins you mention result from the mold not being locked tightly together, or from warpage. Possibly you may be operating at too high a temperature, or the composition of the mold may be such that it is not suitable to resist thermal shock. For molds the consensus seems to be that the total carbon should be as high as possible. Rule of thumb regarding mold thickness is that it should be three to four times the thickness of the casting. Water cooling probably would help, but it will make the molds more cumbersome to handle. Also more care will be required in pouring so that the water lines are not damaged by metal spills, and any leakage will have to be guarded against so that the area around the molds will be dry.

Foundry Layouts Not Easily Made

Q.—We operate a foundry in Mexico, and will appreciate receiving a sketch showing the arrangement of a small mechanized plant since we intend to make such a change gradually.

A.—We regret that we will be unable to comply with your request for a sketch showing the arrangement of a mechanized foundry since there are many factors which should be considered in making such a layout. These would include the type of castings, size of the building, number of molders, present equipment, etc. As you can see, the work would involve considerable time and study, and it would be preferable for you to get in touch with firms supplying foundry engineering service.

For a background along the lines you are planning, we believe you will be interested in an article, entitled "Mechanization for the Small Foundry," by A. W. Gregg which appeared in the August, 1948, issue and which gives information on a step-by-step procedure to be employed over a period of years for mechanization.

Suppose your foundry employed less than 100...

If your foundry employed less than 100 workers, would you handle scrap and pig iron by hand—or with a magnet?

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An Ohio Lifting Magnet is the lowest cost way to handle ferrous raw materials. For example: foundries unload a 40-ton carload of scrap in only 90 MAGNET-MINUTES instead of 40 man-hours. These same foundries recommend Ohio Magnets for their dependability and 20-year life.

Save time . . . save money by turning costly man-hours into profitable magnet-minutes. Write to Ohio—*25 years a leader in magnetic materials handling.*

How would you handle ferrous raw materials?

SELECT YOUR MAGNET from two Ohio types. The PROTECTO-WELD magnet, shown above, is made in 39, 46, 55 and 65-inch diameters. Bolted construction types include these and other smaller sizes.

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Ohio MAGNETS

A-1920

Men OF INDUSTRY

GEORGE L. MITSCH has been appointed plant manager at the St. Louis foundry of the American Car & Foundry Co., New York. Mr. Mitsch was graduated from the Missouri School of Mines and Metallurgy in 1940 and following two years with American Car & Foundry Co. at Berwick, Pa., he joined the Eastern Aircraft Division, General Motors Corp., Trenton, N. J. In 1945 Mr. Mitsch returned to American Car & Foundry in the St. Louis foundry and later was appointed assistant plant manager.

♦ ♦ ♦

Robert Hartman has been named production manager, Hanford Foundry Co., San Bernardino, Calif., succeeding **Edwin Relph,** who has been appointed work manager. Mr. Relph served his apprenticeship as a molder with General Electric's foundry in Toronto, Ont., and Axelson Mfg. Co. Ltd., Los Angeles. In 1928 he joined Warman Steel Casting Co., Los Angeles, as a molder and remained there until 1944, when he joined Hanford Foundry as molding foreman. In 1947 he became production manager and was appointed works manager in November. Mr. Hartman joined Utility Electric Steel Foundry, Los Angeles, in 1934 where he worked successively in the foundry, pattern storage, shipping, timekeeping and order departments. He was appointed production manager in 1940 and joined Hanford last November.

♦ ♦ ♦

Jacques Varlet, outstanding figure of the Belgian foundry industry, was honored recently by presentation of the cross of officer of the order of Leopold II for his contributions to the industry over a period of 65 years. A member of the Belgian parliament made the presentation to Mr. Varlet at an inaugural session of a new foundry course for foremen instituted in Belgium under patronage of the Association Technique de Fonderie Belge. Mr. Varlet began his foundry apprenticeship at the age of 12. The following years were spent in leading foundries and in improving his knowledge of casting of chilled iron rolls and the study of high duty cast irons. He became expert in use of the open-hearth furnace, the rotary furnace and use of pulverized coal as well as progress in melting practice. Mr. Varlet has managed the foundries at the Society d'Esperance Longdoz for 40 years and is now foundry consultant there. Self educated, he devoted himself to help and encouragement of foundry apprentices and young workers. He was one of the founders of the Association Technique de Fonderie Belge and is an honorary member of the Institute of British Foundrymen.

♦ ♦ ♦

Dr. Frank B. Jewett, formerly chairman of the board of directors, Bell Telephone Laboratories, has been appointed a member of the board of trustees, Battelle Memorial Institute, Columbus, O., succeeding the late Dr. Rolland C. Allen, Cleveland industrialist. Dr. Jewett was graduated from Throop Polytechnic Institute, now California Institute of Technology, in 1898, and received a doctor of philosophy degree, from University of Chicago. He joined American Telephone & Telegraph Co. in 1904 as an engineer and 8 years later became assistant chief engineer, Western Electric Co., where he advanced to operating vice president. In 1925 he was appointed vice president in charge of development and research of American Telephone & Telegraph Co. and in the same year president of Bell Telephone Laboratories. He served in the former capacity until 1944 and as president of Bell Telephone Laboratories until his appointment as chairman of its board in 1940.

♦ ♦ ♦

Dr. George E. Ziegler, for the past 6 months acting chief administrator, Midwest Research Institute, Kansas City, Mo., has been appointed director. **Dr. Clayton O. Dohrenwend,** who has been research consultant for over 2 years, has been named assistant director.

♦ ♦ ♦

Paul E. Gerhard has retired as Philadelphia sales representative for American Steel Foundries, Chicago, following 42 years of active service in the steel casting industry.

♦ ♦ ♦

Henry W. Johnson has retired as vice president in charge of manufacturing, De Laval Steam Turbine Co., Trenton, N. J., but will continue as a director and member of the executive committee. **C. Richard Waller** has been named vice president and director for engineering. **H. G. Bauer** has been made vice president and executive engineer. **J. P. Stewart,** manager, commercial sales division, has

(*Continued on page* 102)

GEORGE L. MITSCH

ROBERT HARTMAN

EDWIN RELPH

JACQUES VARLET

8 Pounds Provide Same Carbon Content As 100 Pounds Pig Iron

Here's the answer to pig iron and coke shortages —#946 Federal Carbon Raiser. 8 pounds provide same carbon content as 100 pounds of pig iron. Makes possible the melting of high scrap (even 100%) without sacrificing casting quality . . . minimum chill, shrinkage and hardness. With Federal #946 Carbon Raiser you can reduce melting costs and gain better control of carbon analysis, also reduce range of carbon content fluctuation. Lumps average 2" in size with maximum of 4". Use easy-to-use Federal #946 Carbon Raiser for carbon stabilization or carbon raising. If you prefer ladle addition, use Federal #678 Carbon Raiser. Identical with #946 excepting size. #678 is the fine mesh carbon raiser.

For further details write for free bulletin.

FEDERAL NO. 946 CARBON RAISER

FEDERAL DESULPHURIZER BRIQUETTES

- Reduces Sulphur
- Cleanses the Metal
- Faster Melting Rate
- Increases Slag Fluidity

Packed in 100 pound capacity multi-wall paper bags.

Can be added in cupola or furnace.

Melts at 1564° (851°C).

For further details write for free bulletin.

THE FEDERAL TWINS

The Federal Foundry Supply Company

4600 E. 71ST ST., CLEVELAND 5, OHIO

OFFICES IN ALL FOUNDRY CENTERS

(*Continued from page* 100)

been elected a vice president. **W. A. Reynolds** will continue as manager of the present pump and worm gear divisions and will assume responsibility for development and merchandising of new small products. **W. A. Neumann Jr.** has been appointed controller.

♦ ♦ ♦

Frank J. Whelan, vice president, Worthington Pump & Machinery Corp., Harrison, N. J., has been named supervisor of sales of welding positioners and turning rolls manufactured at the Dunellen Works of the company. Mr. Whelan will also continue to supervise sale of Worthington's standard pumps, conpressors and mechanical power transmission equipment sold through industrial and oil field distributors, as well as sales to original equipment manufacturers. **F. J. Connolly** will continue as manager of the welding positioner and turning roll sales division, and **A. B. Kime** will continue as Eastern regional supervisor, both operating from Dunellen Works. **P. J. Patton Jr.** will remain at the corporation's Chicago district office as central regional supervisor.

♦ ♦ ♦

A. K. Lucas has resigned as general manager, the Lancaster Foundry Corp., Lancaster, O., and has organized the Hocking Valley Foundry Inc., Logan, O., for the production of gray iron castings. Mr. Lucas, prior to joining Lancaster Foundry 7 years ago, was associated with the Miller Foundry Co., Columbus, O., and Alten's Foundry & Machine Works, Lancaster. An active member of the American Foundrymen's Society, Mr. Lucas transferred from its Cincinnati District Chapter to the Central Ohio Chapter when the latter was organized in 1944.

Dr. Kent R. Van Horn, since 1945 chief of the Cleveland branch of Aluminum Co. of America's Research Laboratories, has been named an assistant director of research for the company, with headquarters in Cleveland. **Maurice W. Daugherty,** assistant chief of the Cleveland laboratories during the same period, succeeds Dr. Van Horn as chief. Dr. Van Horn was graduated from Case Institute of Technology in 1926 and received his doctor's degree of metallurgy at Yale University. He joined Alcoa in 1929 as research metallurgist and since that time has written many technical articles as well as a standard textbook, *Practical Metallurgy.* He has served as past president of both the American Society for Metals and the American Industrial Radium and X-ray Society. Mr. Daugherty received his degree in chemical engineering at Purdue University in 1923, when he joined Alcoa's analytical laboratory at New Kensington, Pa. In 1926 he was named chief of the company's chemical laboratory at Niagara Falls. When that laboratory was closed in 1931 he went to Cleveland Research Division to head the chemical metallurgy department where he has earned recognition in test procedures for determining corrosion resistance of light metals. Dr. Van Horn will continue to specialize in improvement of casting and forging processes and alloys, and Mr. Daugherty will supervise laboratory staff work.

♦ ♦ ♦

Bernard H. McGuiness, for 3 years works manager of the Passaic, N. J., plant, Hewitt-Robins Inc., New York, has been appointed vice president of the company's Robins Conveyors Division. Mr. McGuiness, who joined the company in 1923, has been general superintendent of installations for the division for many years in charge of installation of belt conveyors and other materials handling machinery at mines, quarries and industrial plants throughout the world.

♦ ♦ ♦

Leo B. Grant has been appointed manager of the New York sales office of the Dow Chemical Co., Midland, Mich., succeeding the late Ralph E. Dorland who held that position from 1919 until his death last May. Mr. Grant was associated with the company's magnesium division in Midland for 20 years prior to joining the executive staff in New York a year ago.

♦ ♦ ♦

Herbert J. Rosen, recently executive vice president, Griffin Wheel Co., Chicago, has been elected president, succeeding **Ernest P. Waud,** who has been named chairman of the company's executive committee. Mr. Rosen joined the company 48 years ago.

♦ ♦ ♦

Frank E. Early has been appointed Detroit representative of Askania Regulator Co., Chicago, manufacturer of precision controls for industry. Mr. Early will maintain headquarters in Detroit at 15234 Michigan Ave. He has been associated with the company since 1936.

♦ ♦ ♦

Ralph O. Smith has been named president, Wilkes-Barre Iron Mfg. Co., Wilkes-Barre, Pa. Mr. Smith resigned recently as general sales manager, Vulcan Iron Works, Wilkes-Barre.

♦ ♦ ♦

Alfred C. Eastwood, for the past 2 years sales representative in the Lake territory for Tabor Mfg. Co., Philadelphia, is now located at 2331 McKinley Ave., Lakewood 7, O., where he will continue to serve company customers in northern Ohio, north-

(*Continued on page* 105)

FRANK J. WHELAN

A. K. LUCAS

DR. KENT R. VanHORN

MAURICE W. DAUGHERTY

How to put new life into old sand

Here's an amazingly effective way to reclaim sand in your foundry.

Use a Robins Gyrex Screen for your sand recovery operation. It puts new life into old sand . . . *fast!*

This high-speed, large-capacity vibrator screens out lumps, reinforcements, chips, and other unwanted substances. The sand is revived, emerges clean, drops into storage bins, and is again ready for use.

What's more, you get sand that is *always uniformly graded to your exact specifications*. That means you save time. It means you save money, too!

The Robins Gyrex Screen is ideal for your job for three big reasons:

It's flexible. Its slope is adjustable from horizontal to 28° to suit changing load requirements.

It's powerful. Its positive eccentric vibrating shaft and anvil-type base frame are built to take overloads.

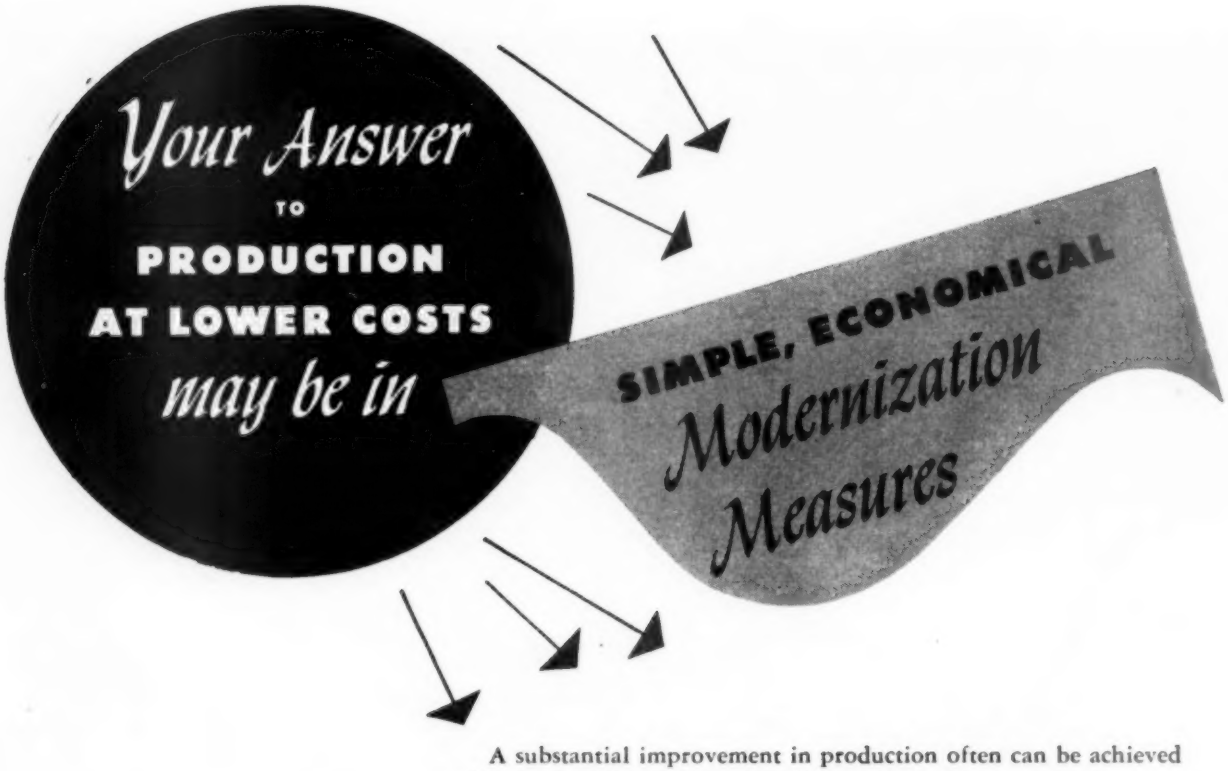
It's durable. Its screening surface is rubber-mounted and held drum-tight under spring tension to prevent the constant flexing that leads to crystallization.

ROBINS

GYREX SCREENS

SEND TODAY for Robins Bulletin No. 115-A. Fully illustrates and describes features, advantages and benefits of efficient Gyrex Screens. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey.

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**



A substantial improvement in production often can be achieved without costly investments in additional space, equipment or personnel. Many foundries have discovered that it is only necessary to employ improved procedures and methods with more efficient use of existing facilities to reach higher production goals.

A survey of your plant by experienced engineers of the Lester B. Knight organization will enable you to learn ways and means to step up your production figures. You will probably be surprised, as others have been, how a few simple modernization measures can make such an improvement in your operations.

You can depend on Knight engineers to give you a quick, accurate analysis of your present operations and to outline a series of corrective measures to solve existing problems. Their recommendations are based on 10 to 25 years of foundry management, engineering and equipment experience.

No job is too small and no job is too large for the Knight organization. Whether you need a reorganization of departments, installation of cost control, job evaluation, standards, incentives, modernization or mechanization, temporary operation or management, or the design, installation and operation of a complete new plant, Knight can do the job for you.

With the present staff of widely experienced specialists, the Knight organization is in an excellent position to be of valuable service to you.

KNIGHT Service for Foundries:

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- Architectural Planning
- Foundry Layout
- Foundry Modernization
- Foundry Management
- Industrial Engineering; Job Evaluation, Incentives
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CONSULTING SERVICE
for Management • Sales • Production

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for Surveys • Modernization • Mechanization

(*Continued from page* 102)

western Pennsylvania, western New York, Michigan, and Ontario, Canada. Prior to Mr. Eastwood's appointment as sales representative, he was an instructor in the operation of the company's abrasive machines and assistant to A. B. Eastwood, designer and engineer in charge of this equipment in Philadelphia.

♦ ♦ ♦

Hobart B. Harden has been appointed manager of industrial division sales, the Wayne Pump Co., Fort Wayne, Ind. In his new work Mr. Harden will be responsible for promotion of industrial sales of equipment including hoists, loading dock lifts, air compressors, etc., exclusive of oil company and oil jobber equipment. For the last 10 years Mr. Harden has been associated with the Globe Hoist Co., Des Moines, Iowa and Philadelphia, as secretary and later as vice president.

♦ ♦ ♦

Clyde A. Sanders has been elected a vice president, American Colloid Co., Chicago, producer of bentonite. Mr. Sanders studied ceramic engineering at Ohio State University where he was active in the development of Ohio clays under the state geologist. Formerly with Lawrence Clay Co., affiliate of Eastern Clay Products Inc., Jackson, O., he has been with American Colloid Co. since 1942. A member of the American Foundrymen's Society, Mr. Sanders has been a guest speaker before many of its chapter meetings. He has also written extensively for the technical press and is the author of *Foundry Sand Practice*.

♦ ♦ ♦

Philip H. Clapp Jr., formerly sales representative, has been appointed sales manager of the Engineered Castings Division, American Brake Shoe Co., New York. A graduate of University of Michigan, Mr. Clapp served as a lieutenant commander in the U. S. Navy during World War II, and joined Brake Shoe in 1946. He will continue to be located at the Engineered Castings Division's headquarters in Rochester, N. Y.

♦ ♦ ♦

William V. McAllister, since 1942 director of purchases, Riley Stoker Corp., Detroit, has retired following 44 years of service with the company. Mr. McAllister was born and educated

WILLIAM V. McALLISTER

in Canada and went to Detroit in 1904 as bookkeeper with the Murphy Iron Works, becoming purchasing agent in 1915. In 1917 the iron works was acquired by Sanford Riley Stoker Co., continuing to be known as Murphy Iron Works until 1920 when it became Riley Stoker Corp. Two years later Mr. McAllister was appointed plant manager and became director of purchases in 1942.

♦ ♦ ♦

Ruel T. Cadwell, formerly secretary-treasurer, Holcroft & Co., Detroit, has been named president, succeeding **Charles T. Holcroft,** its founder, and president since 1917. Mr. Holcroft will remain with the company as secretary and consultant on problems of furnace design. Other recent appointments within the organization include **Walter H. Holcroft,** executive vice president; **C. H. Martin,** vice president in charge of the Chicago office; **Robert H. Cadwell,** treasurer; and **A. W. Criger,** assistant secretary.

♦ ♦ ♦

T. W. Atkins has resigned as executive vice president, the Magnesium Association, to enter the banking business in Painesville, O. Mr. Atkins left banking to become assistant vice president of the Defense Plant Corp., Washington, during the war and was appointed executive vice president of the Magnesium Association three and a half years ago.

♦ ♦ ♦

Felix Petroske, associated with the Loeffelholz Co., Milwaukee, for 61 years, has retired. Mr. Petroske joined the brass foundry at the age of 14 and his service record is the longest in the history of the company. A native of Germany, he came to the United States in 1883 and worked for a short time at two other jobs before starting to work for the Loeffelholz Co.

♦ ♦ ♦

R. B. Brown, Shrewsbury, N. J., has been appointed executive vice president, the Magnesium Assqciation, succeeding T. W. Atkins who has resigned. Mr. Brown has had considerable experience with magnesium through his former connection, Eclipse-Pioneer Division of Bendix Aviation Corp., Teterboro, N. J.

♦ ♦ ♦

Emery C. Prior has been appointed Cleveland district representative, Erie Malleable Iron Co., Erie, Pa., with headquarters in Chagrin Falls, O. The company produces black heart malleable iron castings.

♦ ♦ ♦

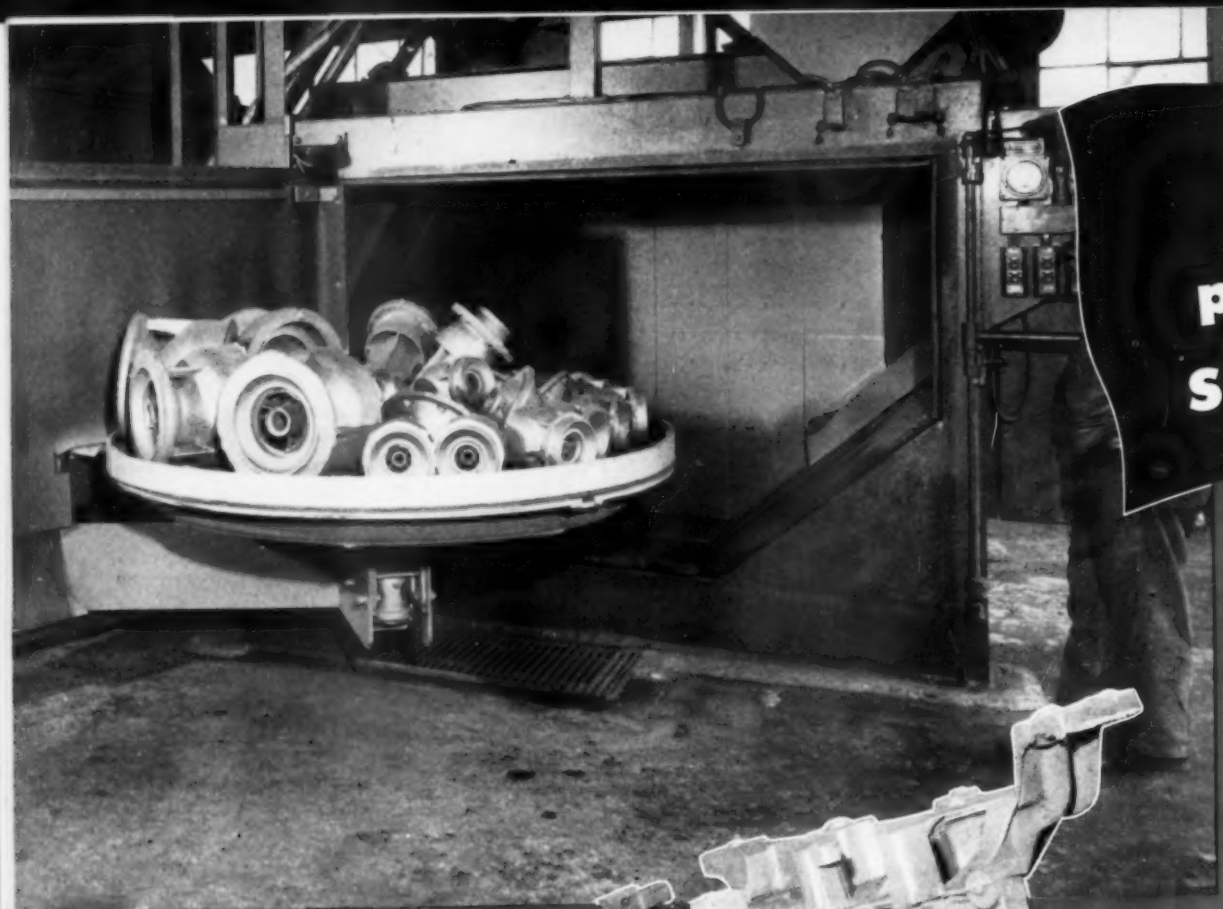
John A. Sargent, formerly vice president of finance, Diamond Alkali Co., Cleveland, has been named ex-

(*Concluded on page* 108)

HOBART B. HARDEN

CLYDE A. SANDERS

PHILIP H. CLAPP JR.



Left: At Layne & Bowler, Inc., Memphis, Tenn., 2500 pound table loads of water pump and well castings are cleaned in 3 to 5 minutes on this 72" Wheelabrator Swing Table.

Center: Cleaning base for typesetting machine on a 66" Wheelabrator Swing Table at Fairview Foundry Co.

Below: 72" Wheelabrator Swing Table installed at Iroquois Foundry Co.

Get these big advantages with a WHEELABRATOR Swing Table

1. REPLACES THE AIRBLAST ROOM -- handles at least 80% of this class of work.
2. HANDLES WIDE RANGE OF WORK -- for shops desiring a versatile general-purpose machine.
3. HYGIENIC -- the operator works outside the cabinet.
4. AIRLESS -- for faster, cheaper, more efficient production
5. SAVES POWER, LABOR, SPACE.

WHEELABRATOR® PERFORMANCE you can break "PAR" with Table's FASTER cleaning

You may say, "Sure, the Wheelabrator cleans faster, cheaper, and more effectively, but what else will this machine do for me?"

The Swing Table does give you other important advantages. For example:

It replaces the Airblast Room because it will handle at least 80% of the work normally cleaned this way. Result — it ends high cleaning cost and laboriously slow production inherent in Room operation. It removes the operator from the dusty confines of the blast chamber.

The Swing Table requires less air for ventilation, is far less costly to erect and install, and takes less power to operate.

Equally important — for the shop that needs moderately priced equipment or where daily production does not warrant several different types of cleaning equipment — is the fact that the Swing Table is versatile and effectively handles a wide range of large or small pieces.

The Swing Table is an exclusive *American* development that has been a boon to a long list of foundries of every size. The advantages it offers are well worth investigating. Full details on all five sizes are given in Catalog 214-A which we will gladly send upon request.

Here's what WHEELABRATOR Swing Tables are doing for others

COMPANY	SIZE MACHINE	PRODUCTS CLEANED	LOADS	CLEANING TIME	EQUIPMENT REPLACED	RESULTS
SESSIONS FOUNDRY COMPANY Bristol, Connecticut	86"	Gray iron castings . . . 25 to 500 lbs. each	Up to 5000 lbs.	4 min. each side	Airblast room, 2 Tumbling Mills	Substantial savings in time and money
McNALLY-PITTSBURG FOUNDRY Pittsburg, Kansas	86"	Steel casting for mining machinery up to 2600 lbs. each	Up to 5000 lbs.	8 to 15 min.	Airblast Room	4 hr. cleaning job on 72" sheave cut to 15 min.
CHEMUNG FOUNDRY CO. Elmira, New York	66"	Gray iron jobbing castings from 1 to 400 lbs. each	Up to 1500 lbs.	3 min. each side	3 tumbling mills and considerable air blast room time	Decreased handling and provided faster, more economical cleaning
MANUFACTURERS FOUNDRY CO. Waterbury, Conn	66"	Gray iron jobbing castings 5 to 750 lbs. each	7 truck engine heads	3 min. per side	10' x 12' Airblast Room	Cleaning costs reduced — more uniform finish on castings
FAIRVIEW FOUNDRY COMPANY Poughkeepsie, N. Y.	66"	Gray iron castings from 1 to 400 lbs. each	Up to 1500 lbs.	4 min.	Airblast room and table and 3 tumbling mills	8 hour cleaning job reduced to 3 hrs.
IROQUOIS FOUNDRY CO. Racine, Wisconsin	72"	Gray iron jobbing castings	Up to 2500 lbs.	3 to 5 min.	Airblast room and 2 tumbling mills	Eliminated 4 men, cut cleaning time from 25 min. to 5 min.

The new Swing Table Catalog No. 214-A graphically describes the speed, economy and versatility of all five Swing Table sizes. Send for your free copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

(*Concluded from page* 105)

ecutive vice president. Mr. Sargent, a graduate of Yale University, joined Diamond Alkali in 1946 as treasurer, following duty with Headquarters Army Service Forces, Washington.

♦ ♦ ♦

Richard Kirchmayer has been appointed district manager of a new Chattanooga, Tenn., branch office recently opened by Sterling Wheelbarrow Co., Milwaukee. Mr. Kirchmayer served his apprenticeship of 5 years at Nordberg Mfg. Co., Milwaukee, and then spent 5 years as a patternmaker at the Mare Island Navy Yard, Vallejo, Calif. Following the recent war he became vice president, Austin Gray Iron Foundry Corp., Sheboyan, Wis.

♦ ♦ ♦

Howard G. Hammer, treasurer of George J. Hagan Co., Pittsburgh, manufacturer of industrial heating furnaces, has retired. Mr. Hammer, a founder and first president of the company, has been in the furnace business for 41 years.

♦ ♦ ♦

Gilbert R. Funk has been named works manager and a director of Waukesha Foundry Co., Waukesha, Wis. Mr. Funk has been associated with the company for 20 years and has been in charge of manufacturing and engineering for the pump division for the past 10 years. In his new position Mr. Funk will be in charge of all manufacturing and foundry operations at both the Waukesha and Watertown, Wis., plants.

♦ ♦ ♦

J. Wesley Cable, formerly director of research and sales, Induction Heating Corp., New York, has opened offices as a consultant to the high-frequency heating field, at 325 East 41st St., New York 17. A graduate of Rensselaer Polytechnic Institute with a degree in electrical engineering in 1933, he was associated with Consolidated Edison Co. of New York Inc. for 8 years and joined Induction Heating Corp. in 1941. Mr. Cable has specialized in development of dielectric baking of foundry cores and is the author of numerous papers and articles on induction and dielectric heating.

♦ ♦ ♦

Ohio State University, Columbus, has announced the following appointments affecting 1948 graduates of the Department of Industrial Engineering. **Thomas S. Dole,** a December, 1948 graduate has joined the Ironton, O., foundry of Dayton Malleable Iron Co., Dayton, O. One of his assignments will concern redesign of products. Mr. Dole was chairman of the Ohio State University Student Chapter of the American Foundrymen's Society. **John Shinn** and **Harry Placke** have been named foremen, Dayton Malleable Iron Co. **Peter Thomas,** a June graduate who recently completed the 5-month training program offered by Central Foundry Division, General Motors Corp., has been appointed foreman at its Defiance, O., foundry. **David M. Paisley,** a March graduate, has been named foundry superintendent of the Detroit Works, United States Radiator Corp.

♦ ♦ ♦

Frank H. Gibbes, general manager, Gibbes Machinery Co., Columbia, S. C., has retired. Mr. Gibbes left Clemson College 48 years ago to join the company, established in 1877. Following the death of A. M. Gibbes in 1921, F. H. Gibbes became president and when the company became a partnership he was made general manager. Since that time he has guided the organization, which now operates a foundry. **A. Mason Gibbes** and **L. Leconte Gibbes,** sons of the late A. Mason Gibbes, will now manage the business. Both have been with the company since graduation from University of North Carolina save for military service.

♦ ♦ ♦

Eugene W. Smith, for the past 2½ years sales representative, Western Materials Co., Chicago, distributors of foundry sands, aggregates, bentonites, clays and silica flour, has been elected vice president of the company. Mr. Smith was works manager, Lindahl Foundry Division, American Gear & Mfg. Co., Chicago, for 3-1/2 years prior to joining Western Materials Co. from 1929 to 1943 he was president-general manager of his own company, Eugene W. Smith Inc., Evansville, Ind., supplier of foundry sands.

♦ ♦ ♦

J. Seton Gray has been elected chairman of the board of directors, Fuller Mfg. Co., Kalamazoo, Mich. **E. L. Ludvigsen** has been named president and **Harold E. Brey,** executive vice president. Other appointments include **William E. Niness,** vice president in charge sales and **Thomas Backus,** vice president in charge of engineering.

♦ ♦ ♦

Robert H. Taylor has been named president, Florence Stove Co., Gardner, Mass., succeeding the late Edward F. Dobson. Mr. Taylor joined the company in 1932 and has been vice president in charge of sales as well as a director of the company.

♦ ♦ ♦

James W. Moran has been elected president, Baker-Raulang Co., Cleveland, succeeding **E. J. Bartlett** who has become president emeritus and will continue as a director. Both joined the company in 1911.

♦ ♦ ♦

George H. Bachman has been appointed production manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

RICHARD KIRCHMAYER

HOWARD G. HAMMER

GILBERT R. FUNK

WHY 4 TYPES OF KODAK INDUSTRIAL X-RAY FILM?

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Radiography in industry meets widely varying conditions—differences in density of materials, in size of objects, in type of radiation, and in the capacity of the X-ray equipment available.

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TYPE A . . . has high contrast with greater speed. For study of light alloys at lower voltage than practical with Type M, and at 1000 KV, for heavier parts than the finer grain film permits. Used direct or with lead foil screens.

TYPE F . . . offers highest available speed and contrast when exposed with calcium tungstate intensifying screens. Film has wide latitude with lead screen exposure either to X-rays or gamma rays.

TYPE K . . . has medium contrast. Chosen where speed is important and calcium tungstate intensifying screens are not used. Especially advantageous in studying heavy steel parts by gamma rays, and for the fastest X-ray diffraction exposures.

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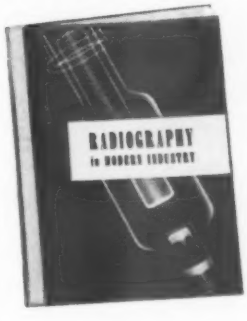

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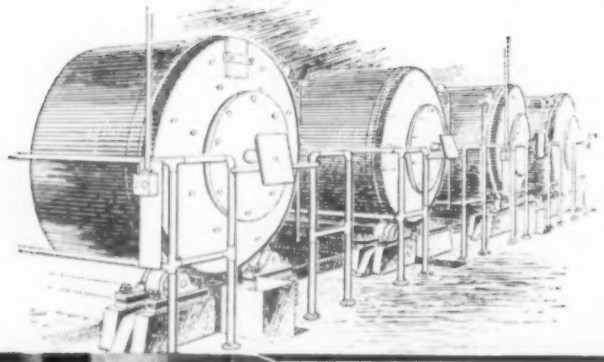
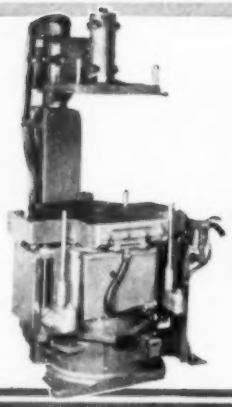
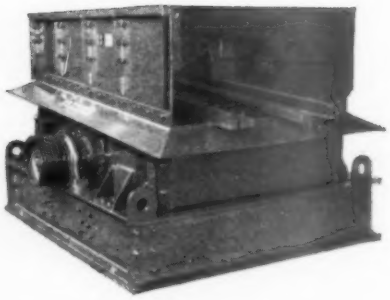
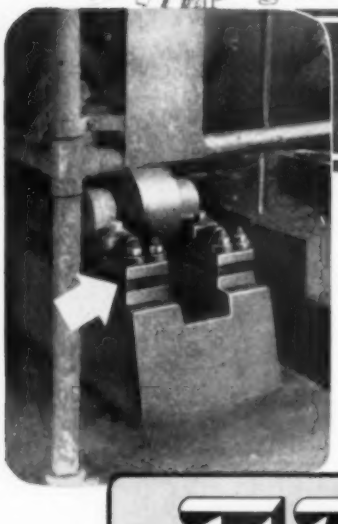


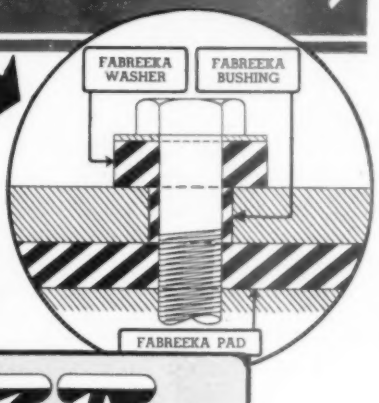






Under All Heavy Machinery

CROSS SECTION OF FABREEKA INSTALLATION



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OFFICERS AND DIRECTORS NOMINATED

By American Foundrymen's Society

NOMINATIONS of officers, to serve the American Foundrymen's Society in 1949-50, and a new group of directors have been made by the AFS Nominating Committee, subject to election at the annual business meeting of the society to be held during the 53rd annual convention in St. Louis.

Edwin W. Horlebein, president and general manager, Gibson & Kirk Co., Baltimore, has been nominated as president to succeed William B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, whose term expires in July. Mr. Horlebein currently is vice president of the society.

Walton L. Woody, vice president, National Malleable & Steel Castings Co., Cleveland, is the vice presidential nominee. Mr. Wood is a past national director of AFS and served as the first president of the society's Northeastern Ohio Chapter.

Directors Are Named

Five men have been nominated to fill three-year directorships. They are: T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa.; L. C. Farquhar, works manager, American Steel Foundries, East St. Louis, Ill.; V. J. Sedlon, president, Master Pattern Co., Cleveland; F. G. Sefing, research metallurgist, International Nickel Co., New York, and L. D. Wright, superintendent, U. S. Radiator Co., Geneva, N. Y. As retiring president, Mr. Wallis will serve one year as a director, succeeding Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburgh, Va., and immediate past president of AFS.

The foregoing list of nominees was selected by the Nominating Committee made up of the following: Chairman, Max Kuniansky; S. V. Wood, president and manager, Minneapolis Electric Steel Castings Co., Minneapolis; A. C. Andrew, foreman, American Locomotive Co., Schenectady, N. Y., representing the Eastern New York Chapter and gray iron; C. E. Shaw, works engineer, American Steel Foundries, Alliance, O., representing the Canton District Chapter and steel; Howard B. Voorhees, foundry superintendent, Peru Foundry Co., Peru, Ind., representing the Michiana Chapter and gray iron; G. W. Zabel, general superintendent of foundries, Fairbanks, Morse & Co., Beloit, Wis., representing the Northern Illinois-Southern Wisconsin Chapter, gray iron, and brass-bronze; Paul L. Arnold, resident manager, U. S. Pipe & Foundry Co., Chattanooga, Tenn., representing the Tennessee Chapter and gray iron; J. O. Klein, vice president, Texas Foundries Inc., Lufkin, Tex., representing the Texas Chapter, malleable iron and aluminum; Anton Johnson, works manager, Oklahoma Steel Castings Co., Tulsa, Okla., representing the Tri-State Chapter and steel.

This committee was selected by the national Executive Committee from candidates proposed by chapters not represented on the Nominating Committee during the last two years.

Annual business meeting of the society will be held Wednesday afternoon, May 4, according to the tentative program released recently for the St. Louis convention. This will be followed immediately by the Charles Edgar Hoyt Annual Lecture. Daytime and evening technical sessions are scheduled for the four days of the congress and, as in the past, meetings of the individual divisions are concentrated to require a minimum number of days attendance to complete each program. Brass-bronze aluminum-magnesium and malleable iron sessions will be held on Monday and Tuesday, while gray iron and steel sessions will be held largely on Wednesday and Thursday. Both the gray iron shop course and sand shop course will be conducted in the evening, Monday through Wednesday. The annual banquet Thursday evening will conclude the convention.

Application forms for hotel reservations at St. Louis during the meeting have been sent to AFS members from Chicago national headquarters. These are to be returned to the St. Louis Hotels Reservation Bureau, which is handling all room assignments. Actual asignment of rooms will be made by the Housing Bureau beginning Feb. 15, the applications being filled in chronological order, insofar as possible, by date received.

St. Louis Convention Program

(Tentative)

Monday, May 2

8:30-5:30 p.m.—Registration.
10-12 noon — Aluminum-Magnesium, Brass-Bronze, and Malleable technical sessions.
12 noon—Aluminum-Magnesium round-table luncheon; Engineering School Graduates luncheon.
2-4 p.m.—Aluminum-Magnesium and Malleable technical sessions.
4-6 p.m.—Malleable and Brass-Bronze technical sessions; Educational Division business meeting.
6:30 p.m.—Educational Division dinner.
8-10—Gray Iron and Sand shop courses.

Tuesday, May 3

9-5:30 p.m.—Registration.
10-12 noon — Heat Transfer, Aluminum-Magnesium and Brass-Bronze technical sessions.
12 noon—Brass-Bronze and Malleable round-table luncheons.
2-4 p.m.—Time Study and Methods, Sand, Aluminum-Magnesium and Pattern technical sessions.
4-6 p.m.—Cost, Sand and Refractories technical sessions; Gray Iron and Malleable joint session.
7 p.m.—Chapter Officers and Directors and Canadian dinners.
8-10 p.m.—Plant and Plant Equipment technical session; Gray Iron and Sand shop courses.

Wednesday, May 4

9-5:30 p.m.—Registration.
10-12 noon—Gray Iron, Sand and Steel technical sessions.
12 noon—Pattern round-table luncheon.
2-2:45 p.m.—Annual business meeting.
2:45 p.m.—Charles Edgar Hoyt annual lecture.
7 p.m.—Alumni dinner.
8-10 p.m.—Gray Iron and Sand shop courses; Gray Iron and Steel joint session.

Thursday, May 5

9-4:30 p.m.—Registration.
10-12 noon—Gray Iron and Steel technical sessions.
12 noon—Gray Iron and Steel round-table luncheons.
4-6 p.m.—Gray Iron and Steel technical sessions.
7 p.m.—Annual banquet.

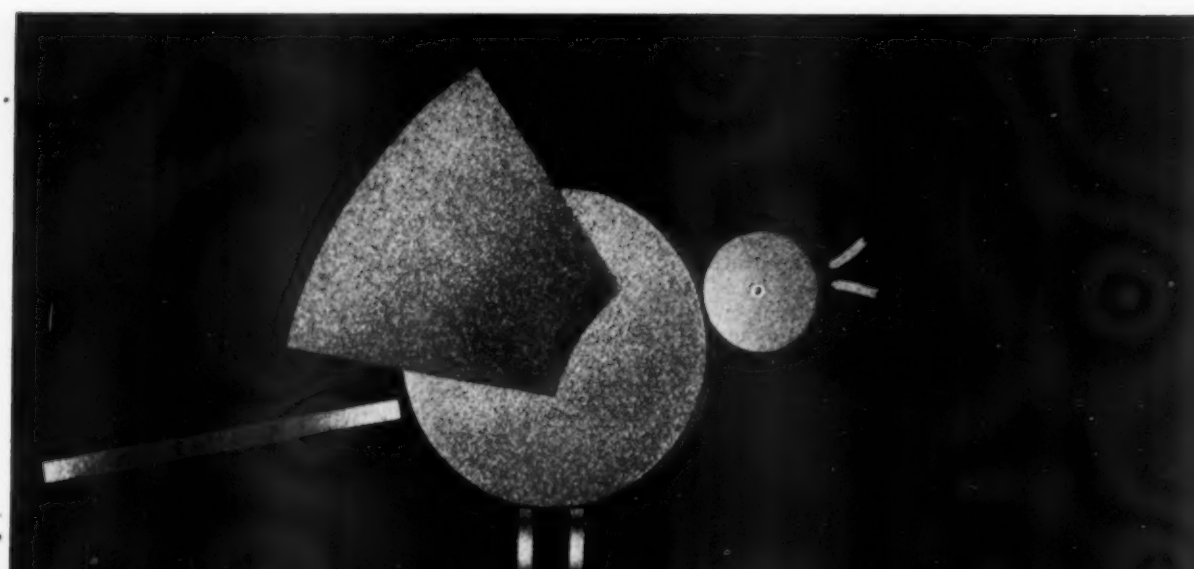
Buys Oven Company

Foundry Equipment Co., 1831 Columbus Rd., Cleveland, has purchased, as part of its expansion program, the industrial oven business of Young Brothers Co., Detroit, one of the leading manufacturers of ovens for industrial processing. Foundry Equipment Co. has for many years specialized in the design and manufacture of ovens for foundry service, particularly for core baking, mold drying and heat treating. Foundry Equipment Co. will operate the Young Brothers Co. under that name, and will continue the sale, manufacture and installation of Young Brothers ovens.

Book Review

Practical Considerations in Die Casting Design, published by New Jersey Zinc Co., New York, cloth, 246 pages, 6 x 9 in. Price $3.

Profusely illustrated book presents information useful to a designer of die castings. Stress is laid on the practical considerations, and the information is presented in a nontechnical manner.



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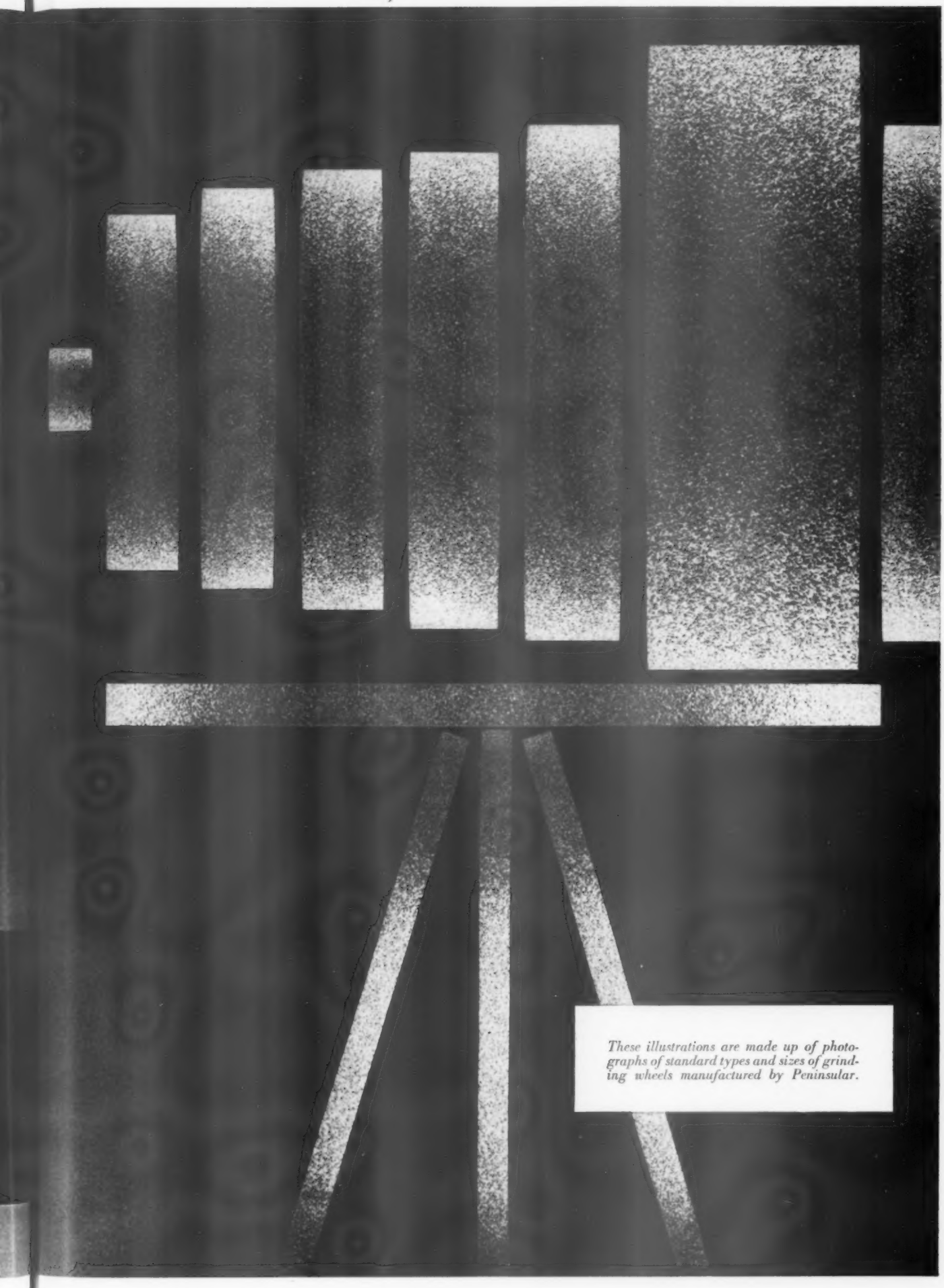

These illustrations are made up of photographs of standard types and sizes of grinding wheels manufactured by Peninsular.

ELECTRIC FURNACE STEEL CONFERENCE

Attracts More Than 550 to Pittsburgh

By EDWIN BREMER
and JOSEPH C. SULLIVAN
THE FOUNDRY

MORE than 550 attended the sixth annual Electric Furnace Steel Conference held at Hotel William Penn, Pittsburgh, on Dec. 2, 3 and 4. Sponsored by the Electric Furnace Steel Committee of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers the conference was directed by Norman I. Stotz, Braeburn Alloy Steel Corp., Braeburn, Pa., chairman, and James A. Bowers, American Cast Iron Pipe Co., Birmingham, vice chairman.

New officers elected for the forthcoming seventh annual conference to be held Dec. 8, 9 and 10 at the Hotel William Penn, Pittsburgh, include Mr. Bowers, and T. J. McLoughlin, Carnegie-Illinois Steel Corp., Pittsburgh, as chairman and vice chairman, respectively. Norman I. Stotz was elected chairman of the executive committee, and John B. Caine, Sawbrook Steel Castings Co., Lockland, O., vice chairman. At the annual dinner held Thursday night, Dec. 2, William J. Reagan, Pennsylvania State College, State College, Pa., was awarded a plaque for outstanding service.

Discuss Operating Safeguards

Opening technical session on "Safety in the Melt Shop" was presided over by T. J. McLoughlin and R. S. Poister, Crucible Steel Co. of America. F. W. Brooke, Swindell-Dressler Corp., Pittsburgh, discussed electrical hazards and pointed out that the four main sources are the secondary leads from transformer to the furnace, interlocks on the circuit breakers, electrical insulation in hot areas, and dust and dirt.

Secondary leads, since they are exposed, are always a potential danger source as they may be struck by a rabble, etc., and attention of operators must be constantly directed to that fact. Interlocks on circuit breakers, whether mechanical or electrical, should be inspected regularly to see that they are in good operating order, and the speaker indicated that a combination of electrical and mechanical interlocking is better than either alone. Furnace operators should be instructed on how the interlocks function, and when and how they should be operated. Dust and dirt on the furnace roof, around the electrode mast and on bus bars should not be permitted as they lead to electrical leakage as well as other trouble.

Discussing mechanical hazards, W. F. Hitchcock, Carnegie-Illinois Steel Corp., Duquesne, Pa., stated that one of the best preventives is good housekeeping. He described numerous types of guards and other devices employed by his firm for prevention of accidents.

Afternoon session on Thursday was devoted to a discussion of gases in steel and was under the direction of M. W. Lightner, Carnegie-Illinois Steel Corp., Pittsburgh, and C. W. Briggs, Steel Founders' Society of America, Cleveland. First speaker was Dennis Carney, Massachusetts Institute of Technology, Cambridge, Mass., who presented a paper prepared in co-operation with John Chipman and Nicholas Grant, also of MIT. Paper pointed out that hydrogen is most important of the gases found in steel. It is absorbed and thrown out of solution rapidly, depending upon conditions which causes difficulty in its elimination. Moisture appears to be the greatest source of hydrogen in steel production. Mr. Carney stated that while considerable is heard about the extremely high pressures generated by small volumes of hydrogen in steel, those values are based upon thermodynamic relationships. Actual pressures developed are only a fraction of the thermodynamic values.

E. W. Pierce, Carnegie-Illinois Steel Corp., Chicago, stated that as moisture in the atmosphere increases, the amount of hydrogen in molten steel increases. He also said that when heats are treated with oxygen the hydrogen content is lower and rejections due to hydrogen faults are less. C. E. Sims, Battelle Memorial Institute, Columbus, O., pointed out that hydrogen may be present in steel in solution or in discontinuities in the structure. Steel loses hydrogen at varying rates depending upon temperature. For example, at 400° F the rate is about 240 times that at room temperature.

Gerhard Derge, Carnegie Institute of Technology, Pittsburgh, mentioned that as far as could be determined the hydrogen content in steel produced in the electric furnace is about the same as that in steel made in the open hearth. As to sources of hydrogen he pointed out that use of dry anthracite as a recarburizer might add 2 to 5 per cent hydrogen. Also he said that molten steel could pick up hydrogen after it was removed from the furnace. L. S. Darken, U. S. Steel Corp., Kearny, N. J., indicated that removal of hydrogen during the boil essentially is physical as the bubbles of carbon monoxide pick up the hydrogen and carry it to the surface of the molten bath.

Friday's technical sessions were divided into two sections. One covered procedures relating to production of acid steel, and the other related to basic steel practices. Morning session on acid practice was devoted to a discussion of application of oxygen in melting while at the afternoon session use of complex deoxidizers was studied. G. A. Safford, Chapman Valve Mfg. Co., Indian Orchard, Mass., and E. H. Weak, American Steel Foundries, East Chicago, Ind., presided at the morning session.

Oxygen Reduces Carbon

Importance of oxygen-pressure-volume relationship on efficiency with which oxygen is used was brought out in a paper on "Use of High-purity Oxygen for Decarbonization in Five-ton Acid Electric Furnaces", presented by Clyde Wyman, Burnside Steel Foundry, Chicago. Utilization of ⅜-inch pipe with 60 psi flowing pressure has given the best results in company's experiments with use of oxygen in 5-ton acid electric furnace. However, more experimentation is expected to be carried out, probably using ¼-inch pipe at higher pressures. Results of experiments to date indicate that rate of carbon removal averages around 7.7 points per minute when passing 135 cfm oxygen. It has been found that an average of 4.13 cubic feet of oxygen is needed to reduce one point of carbon. The rate of carbon removal is dependent on the FeO content of the slag and the manganese content of the bath at start of injection.

Other results from these experiments were: (1) The slag undergoes an initial adjustment when the oxy-

(*Continued on page* 116)

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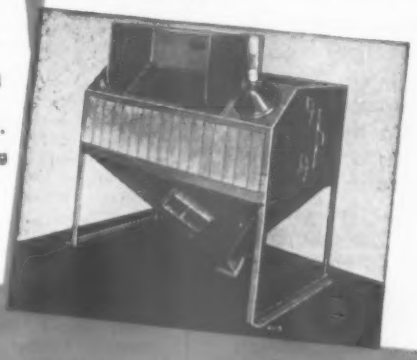

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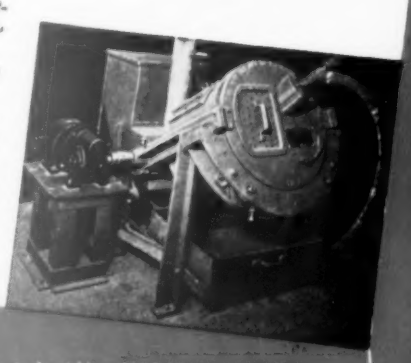

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(*Continued from page* 114)

gen injection commences, after which the FeO content decreases continuously throughout the injection. (2) Bath temperatures have been sharply increased by using oxygen even though the power is off throughout the injection. (3) Furnace refractories have been in better condition with the use of oxygen rather than ore except for the hot zone of one of the two furnaces, where the bricks are slightly eroded, though not seriously.

(4) Fluidity of the metal has been found to be higher with oxygen than with ore and has been more consistent from heat to heat. (5) Physical properties of the castings have been found to be somewhat higher than when ore is used. It is felt that this reflects a greater cleanliness of the metal obtained from the use of oxygen. (6) Recovery of the oxidizable alloying elements has been sharply increased by use of oxygen; ascribed, in part, to the shorter refining period. (7) Economies gained through use of oxygen have exceeded those anticipated at the beginning of the tests. In general, these tests have proved that the use of oxygen is economical and practical.

Oxygen Standard Production Tool

As a result of these experiments, the company now uses oxygen on all heats as standard practice for decarbonization, and plant shortly will be permanently piped so that the present temporary method of delivery can be discarded.

R. J. Wilcox, Michigan Steel Castings Co., Detroit, stated that his company has successfully utilized oxygen in the melting of acid electric stainless alloys and it is now considered a standard production tool. Its use permits utilization of larger quantities of alloy scrap than can normally be used in conventional melting practice and affords a positive means of carbon control. In addition, substantial savings are indicated in power consumption, electrode consumption, and man-hours per ton. Lining costs appear to be about the same with either practice. Quality, as determined by casting soundness and appearance, mechanical properties, and corrosion resistance of 18-8 alloy, is indicated to be of equivalent level. R. H. Jacoby, Key Co., East St. Louis, Ill., stated that initial trials with oxygen for carbon elimination some time ago were unsuccessful, but more recent work carried on after studying procedures employed in other foundries resulted in development of such satisfactory results that the plant will be piped for regular use of oxygen.

Use of complex deoxidizers was discussed with considerable interest at Friday afternoon's session under the direction of R. H. Frank, Bonney-Floyd Co., Columbus, O., and J. W. Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa. Operators attempted to differentiate advantages of various deoxidizers, pointing out where one is better than another under specific conditions. According to certain speakers, results were not too conclusive favoring one or a combination of certain deoxidizers for an individual purpose.

General interest seems to lie in the direction of ability to replace aluminum with something else and yet have freedom from pin hole porosity, particularly for service at 950 to 1050° F. For service within this temperature range, there has been objection to aluminum deoxidation because of embrittlement which has been attributed to aluminum deoxidation.

Cooling Rate Affects Inclusions

G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind., introduced a new factor in regard to deoxidation. He showed that cooling rate in addition to deoxidation has a marked influence on the amount, type and orientation of deoxidation reaction products. Mr. Lillieqvist pointed out that in the production of steel castings, especially those of relatively light sections and weight where it is impossible to have a large riser or head covering the greater part of the cope surface, porosity is a definite problem. This problem is especially critical when considerable machining is required. Whether this pinhole porosity is due to melting practice or a sand condition, experience has shown that aluminum added in the pure state or in alloy forms is the best means for correcting this condition. To study this problem, a special porosity test plate was designed. When deoxidizers, including complex deoxidizers, were substituted for aluminum, varying amounts of porosity were obtained on the test plates. These tests showed that calcium-manganese-silicon used alone would not eliminate pinhole porosity. Magnesium, vanadium compounds and many complex deoxidizers were investigated, but they exhibited very little effect on the control of pinhole porosity.

Insufficient aluminum, while it may take care of porosity, can produce Type 2 or elongated inclusion instead of Type 3 or crystalline inclusion. This would result in considerable decrease in ductility and impact values. Some of the factors which have an influence on the resulting inclusions from aluminum addition to the ladle are: 1. Actual aluminum that comes in contact with the liquid steel in the ladle. 2. Oxidizing condition of the bath. 3. Condition of the ladle. 4. Time of tap-

(*Continued on page* 118)

Meeting Calendar

Feb. 9-10 — Steel Founders' Society of America, annual meeting, Chicago

Feb. 10-11—Regional Conference, Wisconsin Chapter of AFS, Milwaukee

Feb. 17-19—Regional Conference, Birmingham Chapter of AFS, Birmingham

Feb. 21-22—Indiana Materials Handling Society and Purdue University, materials handling conference, Purdue University, Lafayette, Ind.

Feb. 25—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Feb. 28-Mar. 4—American Society for Testing Materials, committee week, Edgewater Beach Hotel, Chicago

Mar. 4—Malleable Founder's Society, eastern sectional meeting, New York

Mar. 11-12 — Ohio Regional Conference, sponsored by Ohio AFS Chapters, Ohio State University, Columbus, O.

Mar. 14-17 — Chicago Technical Societies Council, conference and production show, Hotel Stevens, Chicago

Mar. 25 — Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Apr. 11-15—American Society for Metals, sixth Western Metal Congress and Exposition, Shrine Auditorium, Los Angeles

Apr. 18-20—American Institute of Mining and Metallurgical Engineers, National Open Hearth Steel Committee annual meeting, Palmer House, Chicago

Apr. 18-20—Midwest Power Conference, Sherman Hotel, Chicago

Apr. 22—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

May 2-5—American Foundrymen's Society, annual convention, St. Louis

May 12-13—Instrument Society of America, annual spring meeting, Royal York Hotel, Toronto

May 20—Malleable Founders' Society, eastern sectional meeting, New York

May 23-24—Magnesium Association, annual meeting, Edgewater Beach Hotel, Chicago

May 27—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

June 9-10 — Steel Founders' Society of America, industrial relations meeting, Drake Hotel, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead Hotel, Hot Springs, Va.

June 27-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Oct. 10-14—American Society for Testing Materials, Pacific Coast meeting, Fairmont Hotel, San Francisco

Oct. 13-14 — Steel Founders' Society of America, fall meeting, Ambassador Hotel, Los Angeles

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 27-28—Gray Iron Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 15-17 — National Founders Association, annual meeting, Waldorf-Astoria Hotel, New York

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The photographs are of a typical installation. Large molds are poured with bull ladles carrying metal direct from cupola without repouring. Small molds are poured with 200 lb. mechanical ladles conveyed on Tramrail cranes. Four such ladles replaced many old type 50 lb. hand ladles.

Workers here are enthusiastic about Cleveland Tramrail equipment. It promotes their health and leaves them fresher at the end of a day. Management is happy because molds are poured 2 to 3 times faster than formerly.

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(*Continued from page* 116)

ping. 5. Length of time of pouring the heat. 6. Condition of pouring stream with relation to exposure to air. 7. Sulphur content. 8. Size of section or rate of cooling of the steel in the mold.

It is desirable that the less effective deoxidizers, such as ferrosilicon, be added prior to the special deoxidizers so as to obtain the greatest benefit from the special deoxidizers. Higher sulphur steels have a tendency to produce elongated inclusions and often may require special consideration in the control of inclusion type.

Recent experiments with castings produced from induction furnace heats, both in sand molds and graphite molds, have shown that cooling rates have considerable effect on the type of inclusion that will be obtained when aluminum is used as a deoxidizer. The tests were quite surprising in that poorer results were obtained in the graphite mold when 2½ pounds of aluminum per ton were added to the intermediate manganese steel, even though a denser macrostructure was obtained in the graphite type mold. When ductility results are normally approximately 28 per cent elongation and 54 per cent reduction of area in the sand mold, the results in the graphite mold were around 23 per cent elongation and 35 per cent reduction of area. These castings were examined under the microscope and it was found that the inclusions of the sand casting were Type 3 or crystalline, and those of the graphite mold were Type 2 or elongated. A similar experiment was made where the only difference was that 3 pounds of calcium-manganese-silicon were added in addition to the 2½ pounds of aluminum. In this case results in the graphite mold were satisfactory and the inclusions were crystalline or Type 3, with normal physical properties.

It appears that the calcium-manganese-silicon additions will act as a stabilizer on inclusions.

Company also has established the practice of using calcium-manganese-silicon on critical castings, especially if preliminary sulphur indications are on the high side, as a means of inclusion control. Recent experiments have indicated that a 1 per cent silicon steel using 75 per cent ferrosilicon may aid in the elimination of aluminum additions and thus result in a more uniform product free from porosity, having higher ductility.

Exert Combination Effect

In discussing the use of complex deoxidizers in the acid electric steel making session, J. N. Ludwig Jr., Electro Metallurgical Co., Pittsburgh, described them as "combination of two or more deoxidizing elements, each of which supplements the action of the other. In so doing it is implied that the combination is capable of performing more efficiently than the sum total of the two or more deoxidizing elements; further, in so performing they produce a lower residual amount or a more desirable type of reaction product than would be produced with each of the individual elements."

While a large number of elements can be included in the make-up of complex deoxidizers—aluminum, boron, calcium, carbon, manganese, silicon, titanium, and zirconium are some; however, in acid electric practice the alloys of calcium (calcium-silicon or calcium-manganese-silicon) are generally referred to when complex deoxidizers are discussed.

Mr. Ludwig presented data to show that supplementary additions of calcium alloys properly used are capable of (a) reducing the oxygen level of the steel limits below those of silicon or silicon plus aluminum

(*Concluded on page* 121)

WISCONSIN FOUNDRY CONFERENCE

To Offer Interesting Program

PROGRAM for the 12th annual Wisconsin Regional Foundry Conference includes 24 individual technical sessions to be devoted to discussion of a wide range of topics. The conference, to be held Feb. 10-11 at Hotel Schroeder, Milwaukee, is being sponsored by the Wisconsin Chapter of the American Foundrymen's Society and the University of Wisconsin.

Arthur C. Haack is chairman of the conference, with W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, serving as co-chairman, and Prof. E. R. Shorey and Prof. George R. Barker of the University of Wisconsin associate chairmen.

Speakers at the opening general session Thursday morning, Feb. 10, will include Dean M. O. Withey of the university and William B. Wallis, national AFS president. Dr. J. M. Klotsche, president, State Teachers College, will speak at the annual banquet that evening. Speakers at the two luncheon sessions will be Arthur L. Grede, Grede Foundries Inc., Milwaukee, and Frank G. Steinebach, THE FOUNDRY, Cleveland.

Sectional meetings to be held Thursday afternoon and Friday morning and afternoon will cover subjects relating to steel, gray iron, malleable iron, nonferrous metals, patterns and technical problems.

The complete program follows:

Thursday, Feb. 10

9 a.m.—*Registration*

10-11:50 a.m.—*Opening Address,* Dean M. O. Withey, University of Wisconsin

12 noon—*Luncheon Meeting:* Speaker, Frank G. Steinebach, THE FOUNDRY, "What's Ahead in the Foundry Industry?"

2-3:30 p.m.—

Steel: "What Do We Know About Sand?" by J. B. Caine, Sawbrook Steel Castings Co.

Gray Iron: "Core Baking," by W. Harvey Payne, W. Harvey Payne Co.

Malleable Iron: "Malleable Core Practice," by Erich Welander, Deere & Co.

Nonferrous: "Cement Molding in the Nonferrous Foundry," by Charles Schley, Philadelphia Bronze & Brass Corp.

Pattern: "What a Foundryman Expects of Pattern Equipment," by W. A. Balton, Link-Belt Co.

Technical: "Basic Principles Common to Foundry Melting Practice," by P. C. Rosenthal, University of Wisconsin

3:40-5:10 p.m.—

Steel: "Theoretical Approach to Riser Dimensioning," by Charles Locke, Armour Research Foundation

Gray Iron: "Sand, Metal or Men—Causes of Scrap," by Harry E. Gravlin, Ford Motor Co.

Malleable Iron: "Sands and Binders," by Earl Woodliff, Foundry Sand Engineering Co.

Nonferrous: "Sound Aluminum Castings," by B. D. Claffey, Acme Aluminum Alloys Co.

Pattern: "Specialized Production Patterns," by Frank M. Kulka, Motor Castings Co.

Technical: "What Is Strength?" by J. B. Caine, Sawbrook Steel Castings Co.

6:30 p.m.—*Banquet:* "The Destiny That Is Ours," by Dr. J. M. Klotsche, State Teachers College

Friday, Feb. 11

10-11:50 a.m.—

Steel: "Reproducibility of Mechanical Tests," by Dr. H. A. Schwartz, National Malleable & Steel Castings Co.

Gray Iron: "Statistical Quality Control in the Foundry," tentative

Malleable Iron: "Grinding Problems," by an engineer from the Norton Co.

Nonferrous and Pattern: "Permanent Molds," by S. Sandelin and foundry engineer

Technical: "Color Photography and Polarized Light in Metallography," by Charles S. Foster, Eastman Kodak Co.

12 noon—*Luncheon Meeting:* Speaker, Arthur L. Grede, Grede Foundries Inc., "My Impressions of Europe Today."

2:30-4 p.m.—

Steel: "Improving the Quality of Steel Castings To Offset Substitute Materials," by William J. Phillips, Steel Founders' Society of America

Gray Iron: Tentative, B. P. Mulcahy, Fuel Research Laboratory Inc.

Malleable Iron: "Recent Developments in Malleable Iron," by Richard W. Heine, University of Wisconsin

Nonferrous: "Information - Please General Discussion of Foundry Problems." Speakers panel: A. K. Higgins, Allis-Chalmers Mfg. Co.; Lou G. Jessup, Federated Metals Div., American Smelting & Refining Co.; William Ball, R. Lavin & Sons Co.; George Anselman, Woodruff & Edwards Inc.

Technical: "New Tests for Molding Sand."

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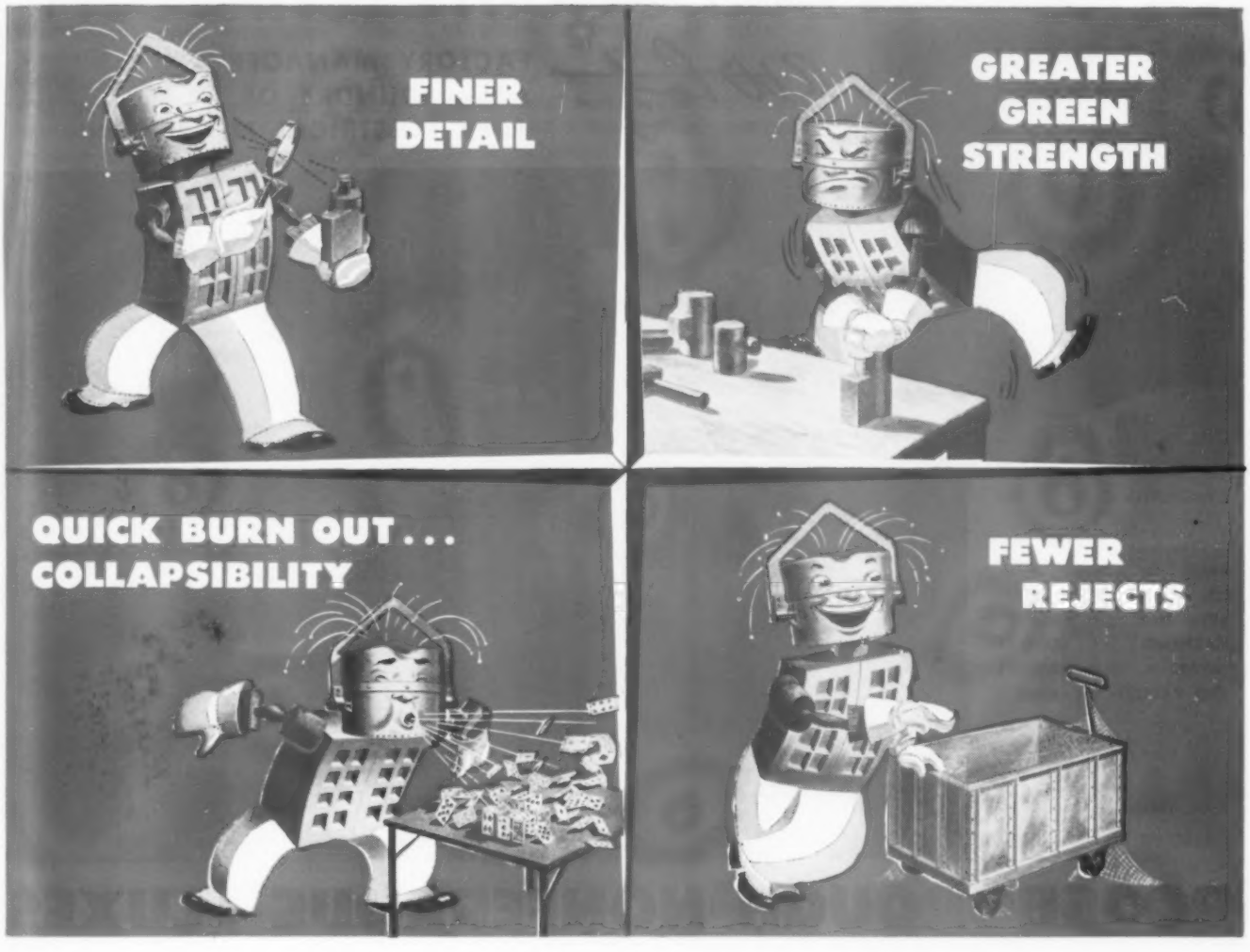

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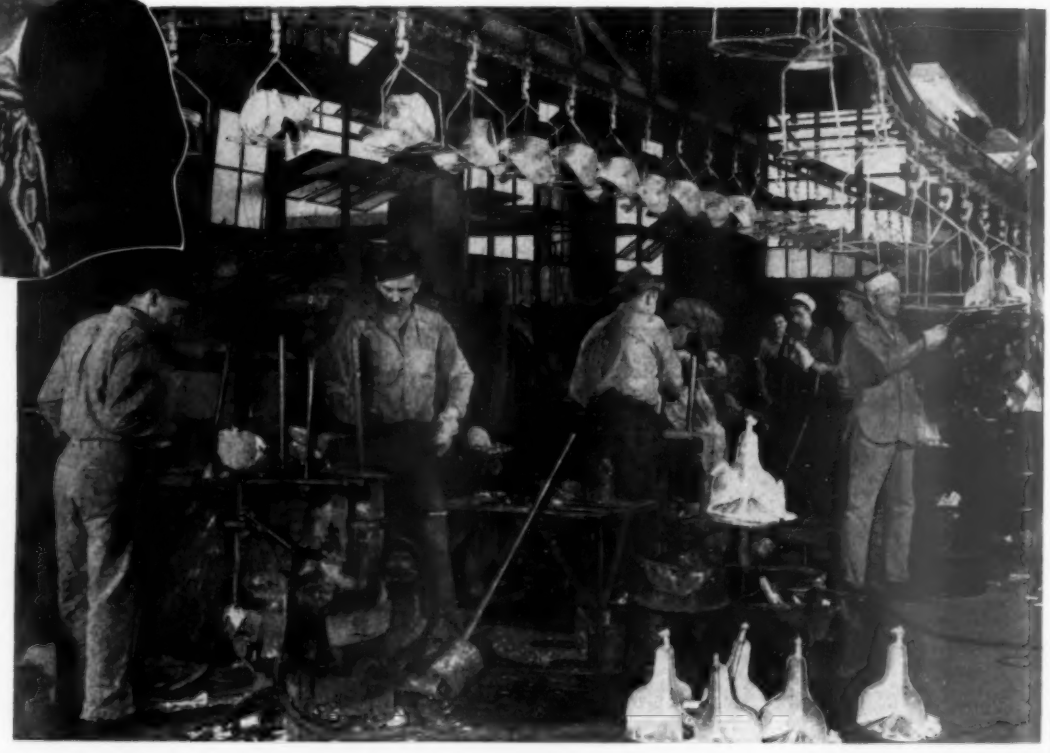

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(*Concluded from page* 118)

alone, and (b) altering amount and type of deoxidation reaction products (inclusion ratings)—such alterations resulting in improvement in physical properties and quality of steel for exacting requirements. He stated that in acid electric steelmaking practice the calcium alloys (calcium-manganese-silicon alloy especially) have generally proved satisfactory. Where exceptions were met, it was believed that inconsistent performance could be attributed to: (a) inadequate amount of alloy; (b) improper prior preliminary oxidation or deoxidation; (c) careless timing or bad tapping techniques.

Conference was concluded Saturday morning with an educational type meeting which was well attended. Chairman and co-chairman of the session were Gilbert Soler, Atlas Steels Ltd., Welland, Ont., and Charles Locke, Armour Research Foundation, Chicago. Meeting was opened by presentation of two motion pictures on melting and refining electric furnace steels through the courtesy of Allegheny-Ludlum Steel Corp. These were followed by a paper on "Elementary Principles in Making a Normal Alloy Electric Furnace Heat" by W. M. Farnsworth, Republic Steel Corp., Massillon, O.

Remainder of the session was devoted to a question and answer period with a panel of experts on the receiving end. The experts included M. J. Meinen, Crucible Steel Co. of America, Midland, Pa.; Samuel Arnold III, Pittsburgh; R. K. Kulp, Electro Metallurgical Co., Pittsburgh; C. R. FonDersmith, Armco Steel Corp., Middletown, O.; G. T. Stowe, E. J. Lavino & Co., Philadelphia; C. K. Donoho, American Cast Iron Pipe Co., Birmingham; C. B. Williams, Massillon Steel Castings Co., Massillon, O., and C. W. Briggs, Steel Founders' Society of America, Cleveland.

Book Review

NFPA Handbook of Fire Protection, tenth edition, by Crosby, Fiske and Forster, edited by Robert S. Moulton, cloth, 1544 pages, 5½ x 7¾ in., published by National Fire Protection Association, Boston.

This is a complete revision of the ninth edition, published in 1941, with detailed treatment of the numerous new developments in the fire protection field and revision of all data that have become obsolete. Aim of the book is to provide essential information on fire prevention and fire protection.

Refractories Fellowships Established

IN the interest of furthering the training of technologists for the refractories industry, the American Refractories Institute has sponsored fellowships for worthy graduate students who are interested in the study of problems relating to refractory materials. Eight fellowships on refractories have been established at universities having ceramic departments, and a brief outline follows of the work which has been completed or is in progress.

R. L. ALLEN

H. C. BRASSFIELD

W. E. BROWN

W. D. FITZPATRICK

J. R. HENSLER

W. D. KINGERY

R. A. MORGAN

H. H. WILSON JR.

Richard L. Allen, of the Research Foundation at Ohio State University, is investigating the influence of very high forming pressures on the porosity, density, and strength of refractory compositions, containing high percentages of coarse nonplastic materials.

Henry C. Brassfield, at the Missouri School of Mines and Metallurgy, is studying the behavior of titanium dioxide on silica brick during burning, as a catalyzer, to convert quartz to cristobalite and tridymite. X-ray spectrometer data on fired samples, as well as those obtained during heating, are to be used to evaluate the extent of the conversion.

William E. Brown, in the School of Ceramics at Rutgers University, is engaged in learning of the part played by alkalies on the refractoriness of siliceous fireclay brick. Use is to be made of the hot load test to study the effect of these fluxes when added to alkali-free mixes.

William D. Fitzpatrick, in the Ceramic Engineering Department of the University of Illinois, is conducting an investigation on some of the effects of the glass phase present in certain refractory compositions.

J. Raymond Hensler, in the Division of Ceramics at Pennsylvania State College, has been engaged in the study of electrical resistance of refractories at elevated temperatures. Later he expects to measure this property, up to practical temperature limitations, on commercial and laboratory-prepared refractories, the maximum temperature of the equipment to be of the order of 3600° F.

William D. Kingery, of Massachusetts Institute of Technology, is investigating certain orthophosphate cements for use in refractory compositions by studying the mechanism of setting, their bonding properties, and the effect of heat on their stability. Later, an attempt will be made to correlate the setting action with atomic structure.

Robert A. Morgan has studied in the Division of Ceramics at Pennsylvania State College certain phase relations of the system beryllia-alumina-silica which are of interest to ceramists and metallurgists, the results of which are being prepared for publication.

Hugh H. Wilson Jr., in the Department of Engineering Research of North Carolina State College, is determining the hot load-bearing characteristics of silica-clay refractory compositions made from selected raw materials prepared with controlled grain sizes.

AROUND Detroit

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Automobile production seen catching up with demand . . . Steel and iron market is easing . . . Detroit Chapter of American Foundrymen's Society plans congress of foundry experience

SUDDEN trimming of production schedules at Kaiser-Frazer Corp. after a holiday shutdown for inventory-taking brought immediate cutbacks in releases for materials and parts. Daily assemblies were slashed from 675 to around 400; this meant the layoff of 600 at the Detroit Engine Division of K-F which assembles power plants for the cars, and this in turn forced Wilson Foundry & Machine Co. in Pontiac to reduce its work week from five to four days. The entire chain of events gave the automotive industry generally a little jolt and speculation was voiced over how soon a buyer's market might hit other manufacturers, particularly the independents.

At present these manufacturers are pushing production schedules to the limit, and if there is any softness appearing in the retail market it is being ignored as a seasonal matter. Unquestionably, dealer stocks in the field are being built up appreciably, but that is nothing new for this time of the year. In the past three years there has been virtually no such thing as dealer stocks while in the normal pattern of the industry January and February always have seen these stocks pushed up to high level in anticipation of a spring buying rush.

Kaiser-Frazer blames the effect of credit regulation W for their sales problem on the ground that buyers in the medium class field cannot afford to pay $100 a month or more to complete payments within the specified 18-month period. Extension to 24 or 30 months is sought and pressure was being put on Congress and the Federal Reserve Board to lift the restrictions.

THE ENTIRE pig iron market is much easier, as evidenced by continuing weakness in foundry scrap, now going begging at $60-$65 per ton. The suggestion of a return to normalcy in iron and steel markets is convincing to many observers. They see early discontinuance of all gray market purchases of steel, ingot conversion arrangements and other high-cost procurement policies which have become peculiar to the postwar period. They will even forecast ample tonnages of iron and steel available in 60-90 days.

* * *

LINCOLN-MERCURY Division of Ford last month instituted a 10 per cent reduction in assemblies of Lincoln and Mercury models, officially ascribing the move to depleted raw materials. Layoff of 1200 at four plants was necessary. Despite the temporary slowing of schedules, it is planned to build more cars this year than last, total for 1948 being 193,390, against a planned 235,000 for this year. On May 1 Mercury production will be boosted about 10 per cent from the current 700 daily. Meanwhile Ford output is to be boosted Apr. 1 from the present rate of 4200 daily to 4350, leading some to conclude materials are being diverted from Lincoln-Mercury to Ford where order backlogs are higher. Production of Ford passenger cars and trucks for 1949 is expected to exceed 1,000,000, compared with 850,856 for last year when operations were suspended for several months because of the extensive model change.

Plans for an entirely new gray iron production foundry at the Ford Rouge plant are rumored to have been reactivated. Despite a multimillion-dollar expenditure in the past three years to modernize various departments in the present foundry—core-room, sand handling, etc.—the operation is said still to fall short of what an up-to-date high-production automotive foundry should be in the opinion of some Ford production officials. The question is whether to attempt rearrangement of the present facilities or whether to start all over from scratch and lay out a completely new sequence. Technical experts who have been close to the Ford foundry over the years incline to the latter idea.

A new motor manufacturing building also is understood to be in the cards for the Rouge plant of the future. It would probably be tied closely to any new foundry. While there are long-range plans for decentralizing operations of the vast Rouge plant, involving the removal of some departments to outside areas, it is certain the foundry and motor building will remain where they are, for one reason because of the proximity to blast furnaces supplying hot metal for the foundry.

* * *

LOCAL chapter of the AFS is beating the drums for a "congress of foundry experience" it will stage the evening of Apr. 6. The event is advertised as offering "$100,000 worth of consulting service for 50 cents" and is being designed as a down-to-earth analysis of scrapped castings and how to overcome production difficulties. Casting producers in the area are being urged to submit samples of poor castings, with gates and risers attached, along with a case history of the casting, citing details on facing sand, core sand, metal analysis, pouring temperature, ladle additions and other pertinent information. Meanwhile authorities on all phases of foundry practice are being invited to attend and participate in the joint study of the bad castings on hand.

Such co-operative clinics for probing into practical problems have been held in the past and have often brought out valuable suggestions to foundries in difficulty. Much depends upon the direction and planning behind the affair. On the other hand, it is no simple matter to diagnose a defect with only the bare details of molding and melting available. There are experienced consultants daily studying such problems, spending many hours, often days, reviewing on-the-scene practice, and even then finding it no cinch to come up with an answer which will correct the trouble. This is not meant to detract from the sincere efforts of the Detroit group behind the April consultation; merely to suggest some of the road blocks they doubtless will encounter.

Got materials-handling problems?

Get the Right Answer the *First* Time

■ In these days of high production costs, most manufacturers can't afford ***not*** to solve their materials-handling problems right the ***first*** time. Trial and error methods are costly in time and money.

Whatever the equipment might be — gravity or power conveyers, or special conveying machinery — it should be designed specifically to meet ***your*** requirements.

It is real economy to get sound engineering help with your materials-handling problems — help from people whose business is the development of efficient handling methods, and the manufacture of fine conveying machinery.

The Mathews organization makes such service available to American and Canadian industries — service which is complete from preliminary planning to erection in the field, and which is backed up by the facilities of three very modern plants.

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BIRMINGHAM FOUNDRYMEN

To Hold Annual Conference Feb. 17-18

BIRMINGHAM District Chapter of the American Foundrymen's Society will hold another of its popular Foundry Practice Conferences at the Tutwiler Hotel, Birmingham, Thursday and Friday, Feb. 17-18. In addition to the two-day program of technical papers, plant visitations will be conducted both Friday morning and Saturday.

Committee in charge of the conference program is headed by C. P. Caldwell, Caldwell Foundry & Machine Co., with Sam Carter, American Cast Iron Pipe Co., co-chairman. An interesting program has been arranged, the subjects to be discussed including nodular graphite iron, dielectric core baking, gating systems for castings, and the relationship between casting defects and sand properties.

William B. Wallis, national president of AFS, will speak at the Thursday noon luncheon, while Dr. John M. Gallalee, president, University of Alabama, will address the annual banquet Friday evening at which Dr. James T. MacKenzie, chapter chairman, will preside. Entertainment is scheduled for Thursday evening, with the program handled by D. C. McMahen, Harbison-Walker Refractories Co.

Thursday, Feb. 17

9 a.m.—Registration, lobby of Tutwiler Hotel
10:30 a.m.—"Nodular Graphite Cast Irons," by C. K. Donoho, American Cast Iron Pipe Co.
12:30 p.m.—Luncheon. Speaker, W. B. Wallis, national president, AFS
4 p.m.—"Dielectric Core Baking," by J. W. Cable, consultant, Girdler Corp.
8 p.m.—Entertainment

Friday, Feb. 18

9 a.m.—Plant visitations
2 p.m. — "Gating Systems for Castings," movie and talk by W. H. Johnson, Naval Research Laboratory, Washington
3:30 p.m.—"Relationship Between Casting Defects and Sand Properties," movie and talk by Harry W. Dietert, Harry W. Dietert Co., Detroit
7 p.m.—Banquet. Speaker, Dr. John M. Gallalee, president, University of Alabama

Saturday, Feb. 19

Plant visitations

The plant visitation committee, under the chairmanship of Fred S. Middleton, Jackson Industries Inc., has arranged for inspection trips to a large number of plants in the Birmingham area. Plants to be open for visits include the following:

Alabama By-Products Corp., Alabama Clay Products Co., Alabama Foundry Co., Southern Wheel Division of American Brake Shoe Co., American Cast Iron Pipe Co., Anderson Brass Co., W. J. Bullock Co., Caldwell Foundry & Machine Co. Inc., Continental Gin Co., Dimick Casting Co., East Birmingham Bronze Co., Foundry Service Co., Goslin-Birmingham Mfg. Co., Hill & Griffith Co., McWane Cast Iron Pipe Co., Harbison-Walker Rerfactories Co., Jackson Industries Inc., Jefferson Foundry Co., Miller Foundry Co., National Cast Iron Pipe Co., Pressure Cast Products Corp., Sloss-Sheffield Steel & Iron Co., Stockham Pipe Fittings Co., Southern Precision Pattern Works, Thomas Foundries Inc., Unit Stove & Furnace Co., Woodward Iron Co.

British Steel Group Meets in London

The British Steelfounders' Association held its annual dinner in London, Dec. 1. There was a record attendance, and the dinner was altogether a brilliant affair, with F. A. Martin, director of Samuel Osborn, Sheffield, and president of the Association, in the chair.

The association was created as a direct consequence of the difficulties of the war, in December, 1944. There were then several steel foundry trade associations and decisions affecting the whole industry could not be quickly reached, so these various associations joined under the style of the British Steelfounders' Association (B. S. F. A.) which acts on behalf of the industry as a whole on matters affecting the industry, but the separate member associations retain their individuality and each cares for the specific interests of its members.

Dealing with the work of the association's committees, the chairman mentioned the examining of the means to reduce and eliminate dangers to health in steel founding and the studying of other conditions which could make the steel founder's job more attractive. The association, too, by encouragement of joint consultation and other means, aimed to emphasize the partnership of manual, clerical and technical workers with the management in attaining full success of the industry. Looking into the future, the association would continue to make common cause with founders of iron and nonferrous metals in fostering plans to train boys to become craftsmen and in raising the skilled technicians of the future.

The reply to the president's toast was made by Sir Frederick Bain, president of the Federation of British Industry, who spoke strongly against the measure to nationalize the iron and steel industry.

Other speeches were made by Lt. Col. J. P. Hunt, the master of the Company of Cutlers in Hallamshire, who spoke about the many problems confronting the steel founder during and since the war, problems which were soon solved; by Frank Rowe, vice chairman of the association, who stressed the value of co-operation and exchange of knowledge as readily made within the association; and by T. H. Summerson, chairman of the development committee of the association, who proposed the toast to "The Guests," to which Sir John Duncanson, immediate past commercial and technical director of the British Iron and Steel Federation, replied.

Book Review

Metals Handbook, cloth, 1444 pages, 8¼ x 10⅝ inches, published by the American Society for Metals, Cleveland. Price $15.

This 1948 edition, with its larger page size, contains about 30 per cent more material than its predecessor. Prepared by more than 600 engineering and production specialists, the book is divided into four principal sections entitled general, ferrous metals, nonferrous metals and constitution of alloys. General section contains 74 articles on metals, processes and methods including new summaries of wear, oxidation, stress corrosion relief of residual stress and service failures. Ferrous metal section contains 131 articles on such phases as manufacture of steel and iron, shaping, testing, structural properties, welding, heat treatment, finishing, coating and surface treatment.

Section on nonferrous metals contains 102 articles and 220 data sheets, including for the first time discussions of melting, shaping, treating and corrosion. The book also contains a new section on the eight precious metals. Constitution of alloys section contains the first extensive collection of alloy phase diagrams ever published in this country.

Alumin Arts Co., 1427 South 43rd St., Milwaukee, has been incorporated as a foundry by Walter F. Oettinger, Albert J. Van Loan and A. Rapalski.

Over 20 YEARS

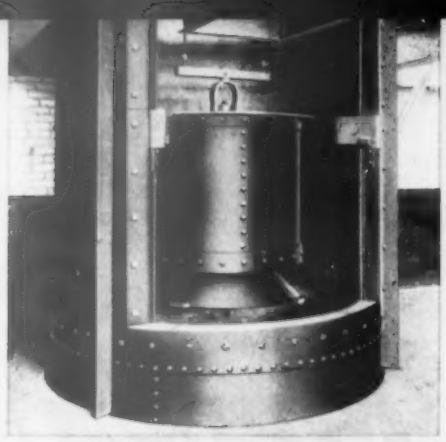
Development of Cone-Bottom Buckets by WHITING

For over 20 years Whiting has been advocating cone-bottom buckets for charging cupolas . . . *true* cone bottoms that extend the full diameter of the buckets and distribute the charge evenly around the periphery of the cupola.

For over twenty years these buckets have helped foundrymen achieve more uniform blast distribution and gas flow, maximum temperature from minimum coke, and minimum oxidation.

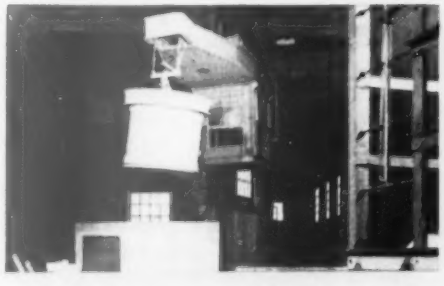
During this 20-year period, constant improvements have been made, and cone-bottom buckets have been adapted for use with inclined skip hoists, underslung, gantry, jib, and horseshoe trolley cranes, and monorail chargers. Whiting also supplies side-dump, drop-bottom, and other standard type charging buckets.

Whiting has consistently kept the lead in the development of equipment for better foundry practice. For the latest—as well as the best—it will pay you to consult Whiting.



One of the earliest cone-bottom buckets, used with an underslung crane charger.

An inclined skip charger with cone-bottom bucket. Note "wishbone" inside cupola door.



Whiting monorail wishbone charging system using cone-bottom buckets.

Cone-bottom bucket used with a Whiting Swivel Charger. Note automatic trigger release mechanism used instead of a wishbone.

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FOUNDRY Developments

By EDWIN BREMER

RECENT experiments have shown that cooling rates have considerable effect on the types of inclusions that will be obtained when aluminum is used as a deoxidizer for steel, according to a paper presented by G. A. Lillieqvist, American Steel Foundries, at the recent Electric Furnace Steel Conference. Using cloverleaf test bar molds made with sand and with graphite, and an intermediate manganese steel to which 2½ lb of aluminum per ton was added, the test bars poured in the graphite molds showed inclusions of type 2 or elongated, while those poured in sand molds had inclusions of type 3 or crystalline. Difference is attributed to the faster cooling rate of the graphite mold. Similar results were obtained with a different type of specimen poured in a steel mold. However, use of 3 lb of calcium-silicon-manganese per ton in addition to the aluminum produced type 3 crystalline inclusions in the specimens poured in both graphite and steel molds.

* * *

TO CONSERVE floor space a newly mechanized gray iron foundry in New England employs a three-decker roller conveyor on its pouring line. The two lower tiers are for molds traveling between the molding department and shakeout, the top tier for returning empty flasks.

* * *

SENIOR metallurgical technology students at the New York State Institute of Applied Arts and Sciences at Buffalo work directly on problems supplied by area metal industries under the direction of David Stein, instructor. They have completed their fourth problem and technical report, and are now at work on several others. These young men in their second year of training beyond secondary school, have three months of co-operative training in industry each year so that practical and theoretical training interlock not only in work experience but in school as well. Niagara Frontier metal industries have been interested in the program from the start. One of the most interesting experiments performed by the students was with frozen cores in place of the conventional baked core.—Helen R. Cornell, *Director of Public Relations.*

* * *

LONGITUDINAL and tangential compressive stresses can be produced at the surface of steel cylinders by quenching from an austenitizing temperature; the magnitude of the stresses being controlled by the draw temperature. In an investigation in this field, H. B. Wishart and R. K. Potter, Carnegie-Illinois Steel Corp., Pittsburgh, in a paper presented at the recent ASM annual meeting found that 1—Cylinders quenched with plugged ends formed a tensile stress at the bore while a compressive stress was formed when the cylinders were quenched with open ends. 2—Appreciable amounts of martensite formed at or near the surface of SAE 1045 and 1035 cylinders when quenched in water; this martensite when drawn materially reduced the surface compressive stress due to the volumetric change which takes place when the martensite is tempered. Surface stresses of the cylinders quenched in oil were not affected as the rate of quench was not sufficient to form martensite. 3—The effect of the ring of tempered martensite on the residual stresses can be eliminated by machining it from the cylinder. 4—No direct relationship exists between changes in hardness and residual stresses. 5—The compressive stresses at or near the surface of the cylinders were in general lowered by decreasing carbon content of the steel where not influenced by the tempered martensite factor.

* * *

FOUR shades of gray for use in painting industrial machinery and equipment are recommended in "Proposed American Standard Gray Finishes for Industrial Apparatus and Equipment, Z55" prepared by the American Standards Association, 70 East 45th street, New York 17. While the standard does not recommend that gray necessarily be used, it does suggest that use of standard shades will help in matching and providing better color harmony. The four standard grays are described according to number and Munsell notation, and for convenience color chips have been prepared for visualization. Colors are light gray, medium light gray (or standard machine tool gray 7-B); medium dark gray and dark gray. Color chips are available for $1 per set.

* * *

FOLLOWING six years of research in its laboratories the Electrochemicals Department, DuPont Co., Wilmington, Del., has developed a vitreous enamel for application to aluminum alloy strips, sheets and castings. Material is fired in the same manner as in applying porcelain to steel except that lower temperatures are employed. The new enamels contain lead, making them unsatisfactory for coating articles which are likely to come into contact with food. Tests have indicated that their resistance to acids and alkalies is comparable to that of enamel on steel. It is claimed that enameled aluminum is being used for colorful, mar-resistant store-front panels, and advertising display letters. Future possibilities include aluminum sanitary ware and accessories, washing-machine tubs and agitators, architectural tile and outdoor furniture.

* * *

RECENTLY issued Circular 460, *Publications of the National Bureau of Standards* listing all the bureau publications from 1901 to June 30, 1947 is available from the Superintendent of Documents, Government Printing Office, Washington 25, for 75 cents. Containing 375 pages the circular lists mathematical tables, building materials and structures reports, circulars, handbooks, commercial standards, simplified practice recommendations, research papers, and miscellaneous publications. Brief abstracts for publications issued from Jan. 1, 1942 to June 30, 1947 also are included.

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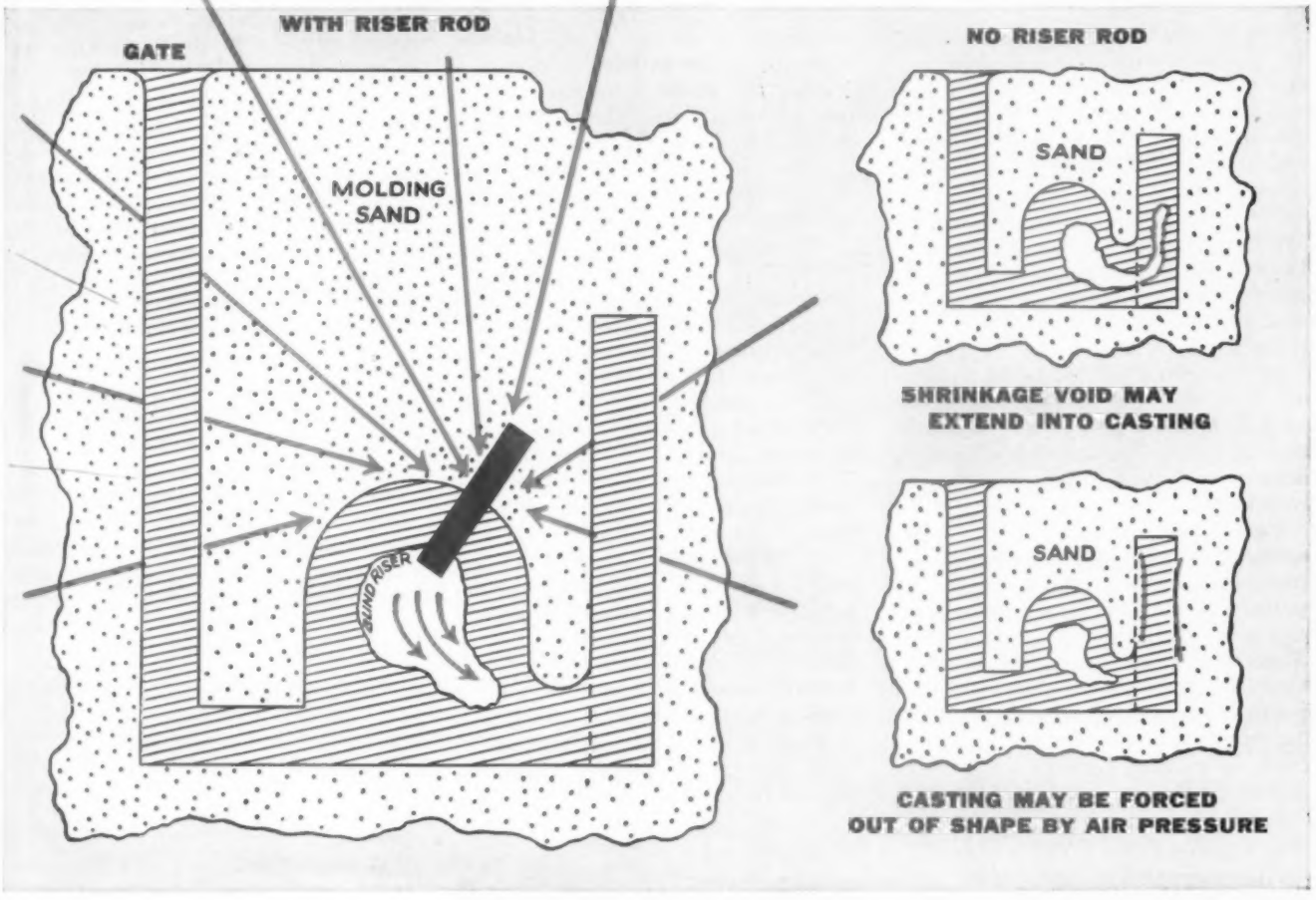

By inserting a "National" graphite riser rod into the mold—as shown above—you keep the blind riser open to the atmosphere during solidification of the metal. The red arrows show how air pressure pushes powerfully through this hole. It forces molten metal into the casting with considerable force.

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BENEFITS of periodic chest x-ray are being brought by the American Brake Shoe Co. to its 10,000 employees scattered throughout 60 plants in 23 states and Canada.

After six years' trial of mobile x-ray apparatus, employing a knock-down 14 x 17 in. film x-ray unit transported in a station wagon, the company recently went all the way, acquiring a G-E X-Ray Corp. photo-roentgen bus especially designed for mobile survey work in the fight against TB.

The reason for this, according to Dr. L. E. Hamlin, medical director, was to cut film costs and boost speed and efficiency through the use of miniature (4 x 5 in. single-frame) film, and to take advantage of the marked psychological effect produced among employees by the sight of the attractive, specially-equipped bus. During the first visit of the bus to a plant recently employees would linger around after work to watch the unit in operation.

By psychological effect is meant not only boosting morale and company loyalty but also further increasing the already high participation among employees in the surveys at each plant.

Use of the new bus offers several advantages over the hauling of a transportable unit throughout the country. Besides the gain in efficiency and cost reduction, there is also the elimination of setup and disassembly time; the provision of darkroom facilities right in the bus itself; and the elimination of danger and expense of moving valuable equipment around by hand. Cost of the fully-equipped bus was $20,000.

According to Dr. Hamlin, where the company formerly felt lucky if it could survey ten plants a year, it will now be able to cover at least half of its 60 plants in that period (doing a complete survey of all employees in each), thus more than tripling its original capacity. Eventual aim is to survey each plant 100 per cent once a year.

The task of conducting the surveys is handled by one technician who drives the bus, takes and develops the films. Thirty-two nurses stationed in the various plants aid him in setting up the surveys.

American Brake Shoe Co. handles the periodic examination program, but for pre-employment examinations it refers employees to local industrial physicians who render regular medical service to its plants.

All medical records of employees are filed at the medical department headquarters in Chicago. In plants having full-time nurses, duplicate records are kept in the first aid department. In both cases, the records are entirely confidential. Reports on all findings are made to the employee directly. All interpretation of routine periodic x-ray films is done at the medical department by Dr. Hamlin and associates.

In 1947, in both pre-employment and survey-type examinations, the firm found 40 cases classified as either active or indeterminate tuberculosis (27 were found in 1946). (The indeterminates could not be proved inactive without further study.) All of these would have gone unrecognized had it not been for x-ray, Dr. Hamlin points out. Discovery of one such case alone, he adds, would have justified the entire cost of the x-ray program for that year.

No employee is discharged for pathology uncovered. In these cases, the employee is advised as to the best course of action.

Besides tuberculosis, several other conditions may be anticipated, particularly among industrial workers—silicosis and siderosis (pigmentation of the lungs due to iron dust). It is important to differentiate it from tuberculosis and silicosis, Dr. Hamlin points out, since many cases of siderosis have been improperly classified. The diagnosis of silicosis must be based on "exposure to significant concentrations of respirable-sized particles of free silica over long periods of time (2 to 25 years—average 10)". It has been demonstrated, he adds, that particles over 10 microns in size have no clinical significance since they rarely reach the alveoli of the lungs. Where x-rays indicate the possibility of occupational disease, the medical director discusses the matter personally with the employee.

Employees X-Rayed Annually

All employees showing occupational fibrosis are x-rayed annually, whether the bus reaches their plant that year or not.

The new bus, in addition to x-ray equipment specially mounted to withstand cross-country traveling, and the darkroom previously mentioned, also has 150 feet of cable for electrical connections, thus facilitating setting up operations in any location convenient for employees.

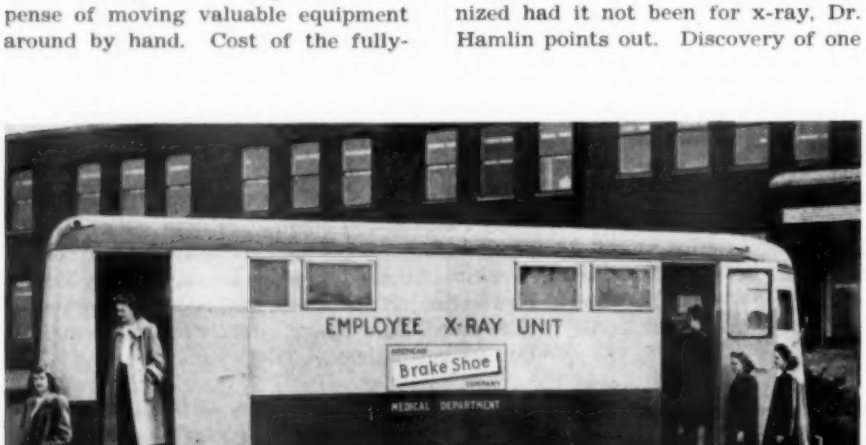
Lead partitions, with leaded-glass windows for observation, are placed before and after the section containing the x-ray tube, to protect the technician as well as employees who stand around before and after exposure.

A photo-timer, used with the equipment, automatically varies exposure time to suit the thickness of the individual chest.

The darkroom features a splash-proof developing tank; also a light-tight box for passing films in and out of the darkroom without admitting light into that room; and a 35-gallon water storage tank.

Other vital equipment includes four 100-watt heaters, safety-glass windows, a coat closet, wash bowl, fluorescent lighting, weather-proof ventilator and ventilating fan, walls and roof insulated with glass wool and covered by fir plywood interior and exterior walls, jacks to stabilize the vehicle when parked for a survey and tubu-

(*Concluded on page* 130)



Bus used for mass chest x-ray work at various plants of American Brake Shoe Co. Photo courtesy General Electric X-Ray Corp., Milwaukee

AJAX-NORTHRUP MELTING

for precision and centrifugal casting DOUBLES YIELD!

Free on request—Ajax technical bulletins covering any melting or heating problem. Just tell us what metal and production rates, we'll rush information to you.

Here's another case where fast, easy-to-control melting with Ajax-Northrup furnaces has teamed up with centrifugal casting—this time leading to greatly increased strength in fine-grained alloy cast iron—and yielding two times as many finished castings per ton of metal melted than was possible with previous gray iron practice.

And in the inset photo, the same kind of success is routine for precision castings. Yes, in centrifugal casting, in lost-wax processes, in precision casting of all kinds, Ajax-Northrup's inherent ability to hit composition and pouring temperatures "on the nose"—at high speed—has reduced "impossible" specifications to mere routine in case after case.

If speed and close melting control without contamination or oxidation are important to you, these success stories can probably be matched in your plant.

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THE AJAX METAL COMPANY • AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC. • AJAX ENGINEERING CORPORATION

(*Concluded from page* 128)

lar-steel welded structure providing the strongest possible construction with minimum weight.

With an ideal setup such as this, it is possible to take as many as 300 films per day, where peak loads are encountered. However, the company plans to average approximately 200 daily.

American Brake Shoe Co. adopted its policy of routine periodic chest x-rays in 1932 as part of an overall health-protection program. Believing that healthy, satisfied workers are one of its greatest assets, it has proved, through the current program, that when management extends itself to such an extent to safeguard health, the results greatly exceed expectations. Chest examinations by x-ray are made on company time.

While this company is unusual in the number and location of its plants, the experience it has gained can be profitably studied even by smaller firms. At present a considerable gap exists between individal firms, such as American Brake Shoe, with their own bus, and the thousands of firms served sporadically via their county tuberculosis association bus. To accomplish employee protection on the scale found necessary by American Brake Shoe, industries located in one area would either have to contribute further to the support of TB association survey activity or join forces in the procurement of their own x-ray apparatus.

The x-ray program in industry is not only a matter of routine periodic examinations and pre-placement radiographs, but also rechecking cases under suspicion. At American Brake Shoe, rechecks must be made at intervals of from 3 to 6 months. All such cases are recorded on a tickler file by the Medical Department, and the various plants are notified with regard to re-check x-rays required of certain employees.

Chicago Societies Plan Conference

The 1949 Chicago Technical Conference and Production Show at Hotel Stevens, Mar. 14-17, will be sponsored by the 55 affiliated societies making up the Chicago Technical Societies Council, of which the American Foundrymen's Society is a founder member. Carrying the theme "What's New," the conference and show will cover a wide range of subjects such as equipment, methods, materials, shop practice, processing, management, research, plant facilities, and other pertinent topics.

Approximately 50 nationally known speakers will participate in the program, and in addition, one of the country's outstanding industrialists will address the banquet on Mar. 16.

R. H. Bacon, Kreicker & Meloan Inc., Chicago, in his capacity as vice president of Chicago Technical Societies Council, is chairman of the conference and production show.

READERS' COMMENT

Forget Tradition in Training

TO THE EDITORS:

I have enjoyed the furor started by Mr. Earle Holmes in his letters on Apprentice Training appearing in recent issues of THE FOUNDRY. The fact that apprentice training and the time necessary to produce journeymen molders, coremakers, patternmakers, or other craftsmen, needs bringing up to date, is supported by many, including those boys who want to become such craftsmen.

Teaching methods have changed since 1850; so have some requirements for becoming apprentices in some plants. The war experiences of training men and women to do certain jobs broke through the tradition that only "time served" is important. Yet the apprentice training course for molders is still the same four years today, as it was in 1850-1875.

I am in favor, indeed, of stiffening the requirements for apprentices, their training and for craftsmen; but if any young man can apply himself more effectively to finish a course in two years, why should he be prevented from doing so?

We shall have to review the entire apprentice training program as some other crafts have done. I understand the craft of "watchmaking" is now taught in special schools in 18 months. There is one difference, however; the school is not called an "apprentice school" or "trade school," but a "School of Horology."

I am hoping, too, for better molders and patternmakers, but they are not coming along with the old time training which requires "time served" above what is being taught. If we have to call the new training methods "School of Casticraft" or something else to get a better training program, let us do so. Above all, however, let us change to the best training methods without being restrained by hide-bound traditions.

Educational Division
American Foundrymen's Society

FRED G. SEFING
Chairman

Materials Handling Conference Planned

Purdue University's Materials Handling Conference scheduled for Feb. 21-22 at the campus is sponsored by the Purdue department of general engineering and the technical extension division with the co-operation of the Indiana Materials Handling Society, Midwest Material Handling Society and the Material Handling Institute Inc.

First day speakers will cover the scope, purpose and pattern of the conference and will discuss production problems, costs and management's viewpoint of materials-handling. Conference members, Tuesday, will discuss space utilization and control, packaging and materials handling, and plant layout and materials handling.

Panel discussions and question periods will follow all speeches and papers presented at the conference.

Book Review

Transactions of the American Foundrymen's Society, Vol. 56, 1948, cloth, 623 pages 8⅛ x 11⅜ in., published by the American Foundrymen's Society, 222 West Adams St., Chicago 6.

The 56 papers and discussions, which were featured during the 1948 annual convention of the American Foundrymen's Society held in Philadelphia, have been published in this volume as valuable additions to the literature on foundry practice. Information contained on ferrous and nonferrous melting and casting procedures as well as laboratory practice and the consideration of engineering education requirements for the foundry industry is readily accessible for future reference through a subject index provided at the end of the book. Also included are: The summary of the society's 52nd annual meeting, president's address; reports of officers; financial statement; minutes of board meetings; and the revised bylaws of the organization which became effective July 1.

Management Books

American Management Association, 330 West 42nd St., New York 18, has issued two additional booklets in its personnel series. They are: "Operating Under the IMRA" and "Relation of Wages to Productivity" priced at $1.25, and "Employee Benefit Plans" and "Collective Bargaining" priced at 75 cents.

Mexaloy Super Refractory Saves Linings and Equipment

Tough, non-fusible protective lining for ladles, spouts, runners and cupolas

Mexaloy is the ideal material for protecting refractory linings of cupolas, ladles, runners and spouts in both foundries and steel plants. Mexaloy makes the body containing it highly resistant to sudden, violent temperature changes and thus avoids spalling and cracking of the refractory. Practically infusible, it will not melt or change its character under the action of molten metal. Neutral and chemically inert, Mexaloy's presence insures resistance to fluxing and corrosive action by molten metals and slags. It provides a low-friction, surface which allows no foreign body adherence.

Mexaloy is extremely easy to apply. Mixed with clay, ground fire brick and water according to a simple formula, the resulting mixture is easily applied by tamping. Linings containing Mexaloy last longer. For example, in the spouts of open Hearth furnaces where the usual loom layer has to be replaced after every one or two heats Mexaloy linings invariably last more than 10 heats—sometimes as many as 30. In Foundry cupolas Mexaloy linings last longer and improve metal quality.

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By W. W. ROSE
Washington

How Much and How Many?

IT IS with considerable hesitancy that so dull a subject as weights and measures is approached. However, in the light of past experience in both military and economic emergency at least a careful consideration of the subject would seem to be warranted.

Any project involving the expenditure of effort, time and money, before it is undertaken, should always be subjected to the acid test of "Will the results to be sought be worth it?" In the case in question this can best be answered by a committee composed of representatives of the suppliers and various types of consumers —the main divisions of foundry industry. The public and the ultimate consumer have little or no interest in it. The government, in the person of the Department of Commerce, has even a greater interest than industry and should unquestionably be represented on such a committee.

Seemed Logical Expedient

Necessity for a preliminary study can well be illustrated by an experience had by the writer some years ago when serving as the president of an American Chamber of Commerce in a country where the metric system of weights and measures prevailed. The members of the chamber, being practically all representatives of American manufacturers, were constantly harassed by the necessity for conversion and approximation; so it seemed a logical expedient strongly to recommend a change to metric standards in the United States. Those most enthusiastic pointed out that the metric system was used by a majority of the nations of the world and harped on the beauties of the decimal in computations.

The points that they missed, and what a committee promptly uncovered, was that, while metric countries predominated in *numbers*, the volume of manufactures made under the English system of weights and measures so far exceeded those of the metric system that the contemplated change would entail an expenditure of such sums for new jigs, dies, fixtures, etc., that the world's economy could not withstand the shock.

On the other hand, no one could be found today who would advocate a return to the old special sections of rails which prevailed before the steel and railroad officials got together and standardized those for the United States and Canada. Just consider for a moment the millions of dollars saved in rolling costs and prompt deliveries from stock.

In Italy, prior to the coming of Mussolini, traffic in some cities passed to the right while in others the opposite rule of the road prevailed. Uniformity of the law saved many times its cost in the ensuing reduction of the automotive accident rate. If our states would only enact uniform driving regulations a like saving would doubtless result.

Just prior to the entry of the United States into World War II the Gray Iron Founders' Society foresaw a probable shortage of raw foundry materials and consequent scramble to accumulate stocks. A long questionnaire listing all supplies and materials was sent to every gray iron foundry in the country asking them to report under each item their consumption during the preceding calendar year and anticipated reqirements for the current year. The unit of measure to be used headed each column.

Disregard Unit of Measurement

The number of replies was splendid, but when it came time to tabulate them it was found that the recommended unit of measure had been largely disregarded and nearly all items were reported in two, three or four different ways. The job of conversion represented by some six hundred reports was staggering. The society had neither the money nor personnel to attempt it.

An appeal was made to the Census of Manufacturers who nobly rose to the occasion, but the conversion problem proved so great that it was months before the tabulation could be completed. By that time allocations and priorities were in full swing and every fellow for himself, and the devil take the hindermost was the order of the day.

Would it not then seem worth while in time of peace to agree that the barrel of a standard capacity, the gallon, the pound, the hundred weight the gross or net ton, the dozen etc., would be the accepted measure of each commodity. An annual survey of consumption could be made and thus the producer, the consumer and the government know within well defined limits the range between bull and bear market demands.

A struggle for uniformity cannot be left until the emergency strikes. It it then too late.

Book Review

Metal Casting of Sculpture, by Carl D. Clarke, cloth, 175 pages, 8 x 11 inches, published by Standard Arts Press, Butler, Md. Price $6.50.

Divided into 17 chapters, this book gives a detailed discussion of the procedures employed in producing statuary and ornamental castings from the original models by use of glue, flexible compound, agar, rubber and resilient plastic molds. Plaster piece molding is not described. The author gives sound advice as follows: "However, neither this text nor the actual observation of work in progress will take the place of actual experience in doing the work itself. The worker must learn the technique by using the actual materials, and making his own mistakes. For this reason it is obvious that he should prepare small molds and casts before he works with larger ones".

In chapters on glue, flexible compound, agar, rubber and resilient plastic molds the author gives various formulas for the materials, the methods of preparation and use. Other chapters relate to the roman joint, wax-resin and investment compounds; making the lost wax cast; metals and their alloys; furnaces; finishing the cast; defects and their repair, and metal coloring.

Buckeye Celebrates 40th Anniversary

Buckeye Products Co., Cincinnati, manufacturer and supplier of foundry facings, supplies and equipment will observe its 40th anniversary this year.

During its lifetime the company has had three locations in Cincinnati, now being situated in its own modern building which was erected some years ago. During an expansion program completed in 1948, a modern laboratory for development purposes and production control was installed, manufacturing facilities increased and larger offices constructed to meet the demands of expanded business.

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Photograph, Courtesy of Gillette Safety Razor Company.

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FOUNDRY ADVISORY GROUPS

Appointed by Munitions Board

MUNITIONS Board of the Military Establishment has appointed nine subcommittees of the Foundry Industry Advisory Committee to the Munitions Board. These committees cover aluminum and magnesium, brass and bronze, cast armor plate, cast pressure pipe and soil pipe, foundry equipment, foundry supplies, gray iron castings, malleable castings and steel castings. In each case, the chairman of the subcommittee is a member of the Foundry Industry Advisory committee.

The Foundry Industry Advisory Committee is comprised of Gen. Donald Armstrong, U. S. Army (Ret.), president, U. S. Pipe & Foundry Co., Burlington, N. J.; George W. Cannon, chairman, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; C. L. Carter, president, Albion Malleable Iron Co., Albion, Mich.; F. Kermit Donaldson, vice president and general manager, Machined Steel Casting Co., Alliance, O.; O. L. Earl, vice president, Acme Aluminum Foundry Co. Inc., Chicago; F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland; John E. Galvin, chairman, Ohio Steel Foundry Co., Lima, O.; E. W. Horlebein, president, Gibson & Kirk Co., Baltimore; Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh; Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va.; A. J. McDonald, vice president, American Steel Foundries, Chicago; W. H. Moriarty, vice president, National Malleable & Steel Castings Co., Cleveland; Thomas W. Pettus, president, National Bearing Div., American Brake Shoe Corp., St. Louis; W. L. Seelbach, president and general manager, Superior Foundry Co., Cleveland; David B. Shannon, general manager, Chattanooga Plant, Somerville Iron Works, Chattanooga, Tenn.; F. E. Shumann, president, Lehigh Foundries, Inc., Easton, Pa.; J. H. Smith, general manager, Central Foundry Div., General Motors Corp., Saginaw, Mich.; Fred S. Wellman, president, Wellman Bronze & Aluminum Co., Cleveland; J. Donald Zaiser, president, Ampco Metal Inc., Milwaukee, with Frank G. Steinebach, editor, THE FOUNDRY, serving as chairman.

FOUNDRY STUDENTS: W. A. Snyder, left, foundry instructor at the University of Washington, Seattle, and students examine new molding machine received recently from Tabor Mfg. Co., Philadelphia, for study and operation in modern foundry techniques. The jar, power rollover, power draw machine, is the portable type but incorporates a shockless feature to eliminate need for special foundation

The subcommittees and their personnel are:

Aluminum and Magnesium: O. L. Earl, chairman; Kenneth Digney president, Oberdorfer Foundries Inc. Rochester, N. Y.; Louis K. Fischer president, Fischer Casting Co., Plainfield, N. J.; Hubert Fruehauf, manager, Dowmetal Foundry Div., Dow Chemical Co., Bay City, Mich.; Peter S. Hardy, president, Peerless Aluminum Foundry Co. Inc., Bridgeport, Conn.; E. T. Korten, president, Reliable Castings Corp., Cincinnati; Allen B. Norton, manager, Castings Div., Aluminum Co. of America, Pittsburgh; Fred S. Wellman, president, Wellman Bronze & Aluminum Co., Cleveland.

Brass and Bronze: E. W. Horlebein, chairman; Elbert C. Austin, vice president, National Aluminum & Brass Foundry Inc., Independence, Mo.; Dan E. Broggi, vice president and general manager, Neptune Meter Co., Long Island City, N. Y.; Leon Camets, owner, Production Foundry Co., Oakland, Calif.; Walter M. Clark, partner, D. W. Clark Brass Foundry, South Boston, Mass.; Jake Dee, owner, Dee Brass Foundry, Houston, Tex.; J. P. Flaherty, president, Johnson Bronze Co., New Castle, Pa.; D. B. Kennedy, assistant secretary-treasurer, Gluntz Brass & Aluminum Foundry Co., Cleveland; Henry G. LeBlanc, president, Standard Brass & Mfg. Co., Port Arthur, Tex.; Joseph Long, president, Atlas Foundry & Machine Co., Tacoma, Wash.; Vaughan C. Reid, vice president, City Pattern Foundry & Machine Co., Detroit; Harry St. John, superintendent, Crane Co., Chicago; Charles H. Stokesbury, general manager, Derby Castings Co., Seymour, Conn.; Walter V. Storm, president, Western Brass Works, Los Angeles; Watson B. Wilkins, president, American Manganese Bronze Co., Philadelphia; H. H. Zoller, manager of sales, Shenango-Penn Mold Co., Dover, O.

Cast Armor Plate: A. J. McDonald, chairman; G. F. Driemeyer, vice president, sales, General Steel Castings Corp., Granite City, Ill.; M. F. Fladoes, president, Sivyer Steel Casting Co., Milwaukee; D. P. Murphy, vice president, operations, Symington-Gould Corp., Depew, N. Y.; L. L. Phelps, works sales manager, American Steel Foundries, Chicago; M. G. Sternberg, president, Continental Foundry & Machine Co., East Chicago, Ind.; W. F. Wilson, general sales manager, Lebanon Steel Foundry, Lebanon, Pa.

Cast Iron Pressure Pipe and Soil Pipe: Gen. Donald Armstrong, chair-

(*Concluded on page* 136)

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Profit-Making Machines that Work for You While You Pay for Them!

Now—you can buy new Milwaukee-Taccone Core Blowers for your foundry on our easy PAY-FROM-PROFITS plan. No substantial cash outlay required. Merely send us your order, then pay for the blowers while they work for you. The savings alone, in many cases, take care of the payments. This new, convenient PAY-FROM-PROFITS plan enables you to replace old, obsolete equipment, step up foundry production and reduce costs *without adding materially to your investment.* Write for complete details.

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Blows green bond cores up to 12 lbs. in size—ideal for high production foundries. Entire blowing cycle only 2½ seconds. Compression cylinder boosts blowing pressure 100% to maintain constant, high pressure. Intricate, quality cores blown quickly with EXPLOSION type action. Accommodates various sized blow heads. Draw cylinder in base, if desired.

FAST, LIGHT CORE BLOWER

This modern, bench style machine blows intricate cores up to 4 lbs. in weight. Synchronized clamping and blowing increase speed and efficiency. Blown cores automatically released, can be removed as fast as blown. Blower steps 90 lb. line pressure up to 120 lbs. blowing pressure.

MILWAUKEE Foundry Equipment Co.

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(*Concluded from page* 134)

man; C. D. Barr, president, American Cast Iron Pipe Co., Birmingham; J. D. Capron, president, Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Kent S. Clow, president, James B. Clow & Sons, Chicago; David Ford, president, Central Foundry Co., New York; C. A. Hamilton, president, Alabama Pipe Co., Anniston, Ala.; A. T. McWane, president, McWane Cast Iron Pipe Co., Birmingham; E. Roy Russell, president, Florence Pipe Foundry & Machine Co., Philadelphia; David B. Shannon, general manager, Chattanooga plant, Somerville Iron Works, Chattanooga, Tenn.

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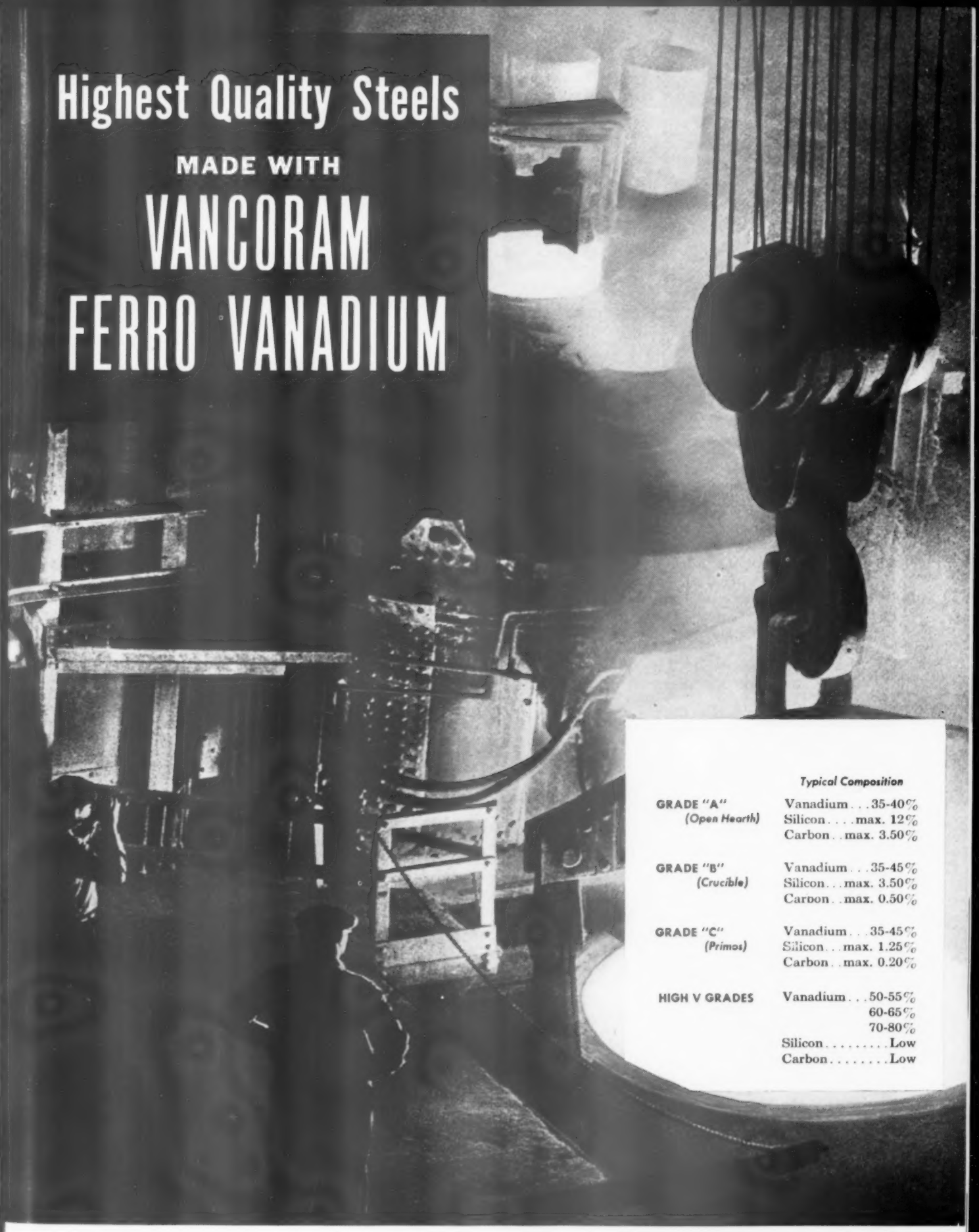
Foundry Installs New Pallet Line

A NEW pallet line for handling molds at the Belle City Malleable Iron Co., Racine, Wis., provides broad flexibility in accomodating different sizes and types of castings, and also improves working conditions. The pallets, 2 ft wide and 5 ft long, are equipped with wheels and travel by gravity over 22 tracks extending from the molding stations to the shakeout. Hot metal is brought by lift truck to the pouring station in 1000-lb capacity ladles and spotted along the lines on an overhead monorail system. Roof ventilators draw off fumes generated during pouring. Poured molds travel to a mechanical shakeout where each pallet automatically dumps its load and drops down to a lower track leading back to the molding stations to begin the cycle of travel over again.

Book Review

Physics of Metals and Alloys, by W. Boas, cloth, 193 pages, 6 x 9½ in., published by John Wiley & Sons Inc., New York. Price $3.50.

Based on a series of lectures in physical metallurgy and written mainly for metallurgists and chemists, this book is intended as an introduction to the physics of metals, and as a basis for further study.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FERRO VANADIUM
Typical Composition
GRADE "A" (Open Hearth)
Vanadium . . . 35-40%
Silicon . . . . max. 12%
Carbon . . max. 3.50%
GRADE "B" (Crucible)
Vanadium . . . 35-45%
Silicon . . . max. 3.50%
Carbon . . max. 0.50%
GRADE "C" (Primos)
Vanadium . . . 35-45%
Silicon . . . max. 1.25%
Carbon . . max. 0.20%
HIGH V GRADES
Vanadium . . . 50-55%
60-65%
70-80%
Silicon . . . . . Low
Carbon . . . . . Low

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CHEMICALS AND METALS

ACTIVITIES OF FOUNDRY Groups

Detroit

EDUCATIONAL committee of the Detroit Chapter of the AFS is sponsoring a Congress of Foundry Experience. The congress will be held on the evening of April 6 at the Rackham Educational Memorial, where regular chapter meetings are held.

In announcing the event, Jess Toth, Harry W. Dietert Co., Detroit, and chairman of the educational committee, stated that $100,000 worth of consulting service will be at the disposal of foundrymen who attend.

Foundries plagued with unusual casting problems will submit samples of their troublesome castings for examination and discussion. The whole congress will unite to give their opinions, suggestions and criticisms.

Harry Gravlin, metallurgist, Ford Motor Co., Dearborn, Mich., will serve as the presiding officer during the session.

Chesapeake

NOVEMBER meeting of Chesapeake Chapter of the AFS was held at the Engineers Club, Baltimore. E. E. Ballard, chief engineer, Lester B. Knight & Associates, Chicago, spoke on "The Development of the Modern Foundry." Mr. Ballard advised operators to balance the molding, melting, pouring, shakeout, and cleaning capacity of their foundries for maximum economy. The health and comfort of the employees also is essential. The plant should be made safe to work in by proper arrangement of equipment, good housekeeping, and by providing safety clothes and instruction in safety procedure.

Preventive maintenance should be practiced to avoid complete breakdown of any piece of equipment. The speaker showed a number of pictures of modernized foundries. During the discussion that followed, Mr. Ballard pointed out that mechanized foundries are not too well adapted to intermittent operation. Bill Danko, National Bearing Co., Portsmouth, Va., supplemented the discussion with a brief description of mechanization of the Portsmouth foundry where 40,000 journal bearings are produced a month.

On Dec. 17 the chapter heard an address by Ernest T. Kindt, president, Kindt-Collins Co., Cleveland. Mr. Kindt traced the history of patternmaking from as far back as the early Chinese. He then described the proper design of a modern pattern shop, the types of equipment, layout, and practices in estimating time and costs of making patterns.

Other subjects discussed were the principles involved in selling patterns, and standardization of pattern equipment, methods and materials. Applications of plastics and plaster in the pattern industry also were discussed. An interesting motion picture showed the manufacture of various patternmakers' supplies in the Kindt-Collins plant.

Prior to Mr. Kindt's talk, John M. Robb Jr., national AFS director,

(*Continued on page* 140)

NORTHEASTERN OHIO Chapter of the AFS held its annual Christmas Party Dec. 16 at Hotel Carter, Cleveland. Views of some of the 1000 members and guests who attended are by courtesy of Sterling Farmer, Sand Products Corp.

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Corn Products Refining Co., N.Y., N.Y.

LESSENS DRYING TIME
YIELDS SMOOTH CORES
REDUCES DISCARDS

FULL TECHNICAL SERVICE, *without obligation, is yours for the profitable use of MOGUL CEREAL BINDER. Write Technical Sales Department.*

CORN PRODUCTS SALES COMPANY

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(*Continued from page* 138)
addressed the group. The coffee speaker, Everett Beavin, chief engineer on the new Baltimore airport construction job, told the interesting story of the problems met and their solutions while constructing the airport. Color slides pictured some of the largest earth digging, moving and packing equipment in present-day use.—*Jack H. Schaum, National Bureau of Standards*

Western New York

APPROXIMATELY 95 members and guests attended the Dec. 3 meeting of Western New York Chapter of the AFS at Hotel Sheraton, Buffalo. Richard G. McElwee, iron foundry division manager, Vanadium Corp. of America, Detroit, spoke on "Operation of the Cupola with Present Day Material Shortages."

Mr. McElwee discussed cupola raw materials—coke, pig iron, stone, air—stating that some foundries get better results than others. One of the reasons given for this was that some foundries build a fence around their cupolas excluding any investigation regarding its operation or the materials used in its operation. Such practice, he maintains, is not conducive to progress or improved operation.

He made some suggestions on hot and cold, wet and dry air blasts and the use of oxygen for standby purposes. His discussion of cupola operation was supplemented by the showing of slides to illustrate points in his presentation.—*Roger E. Walsh, Hickman, Williams & Co.*

Tri-State

L. L. CLARK, Buick Motor Division, General Motors Corp., Flint Mich., was guest speaker at the Nov. 19 meeting of the Tri-State Chapter of the American Foundrymen's Society. Meeting was held at Wilder's Buffet, Joplin, Mo., with 66 members and guests in attendance from various points including Tulsa, Enid, Quapaw and Blackwell, Okla.; Coffeyville, Pittsburg and Baxter Springs, Kan.; and Springfield, Joplin and Webb City, Mo.

The chapter, organized in June, 1946, holds most of its meetings in Tulsa, Okla., but the group plans to conduct at least one and possibly two meetings in Joplin each year. C. C. Beagle, Webb Corp., Webb City, Mo., a chapter director, was in charge of arrangements for the meeting. Dale Hall, Oklahoma Steel Castings Co., Tulsa, and chapter chairman, presided.

Mr. Clark, who is assistant metallurgist in the Buick Division, accompanied his talk, entitled "Cupola Practices," with slides showing cupola practices at General Motors. Following his lecture, he answered questions asked by those present, and took part in a discussion on his subject.

New Jersey

EXpanding activities of the Gray Iron Founders Society were outlined by Raymond L. Collier, executive vice president, at the regular monthly meeting of the New Jersey Foundrymen's Association at Military Park Hotel, Newark, N. J., Nov. 15. The organization, he said, is now nearing its goal of establishing 40 local management groups throughout the country.

H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., newly elected president of the New Jersey Foundrymen's Association, and chairman of the local district group of the Gray Iron Founders, presided.

In outlining the three main efforts of the Gray Iron Founders' Society at this time, Mr. Collier said that

(*Continued on page* 143)

WESTERN NEW YORK: These views of the Nov. 5 and Dec. 3 meetings of Western New York Chapter of the AFS were taken by John R. Wark, Queen City Sand & Supply Co., Buffalo

How to Make Parting Easier...

in the foundry, that is!

Use **"dag"** colloidal graphite dispersions for coating chills, patterns, and permanent molds.

Applied easily by spray or brush, **"dag"** dispersions provide a micro-thin colloidal graphite film that does not affect casting or mold thickness, and greatly improves surface quality. They will also eliminate or reduce the smoke usually caused by parting compounds . . . a definite advantage for the men in the shop.

Try **"dag"** colloidal graphite, too, for lubrication of push pins, shoulder screws and flask pins . . . eliminate binding and stripping.

Find out more about how **"dag"** dispersions can improve your foundry product and your working conditions.

Mail the coupon TODAY!

Coating a permanent mold with "Aquadag" at the Wisconsin Aluminum Foundry Company, Inc., Manitowoc, Wisconsin. "Aquadag" is the ***"dag"*** *colloidal dispersion of graphite in distilled water.*

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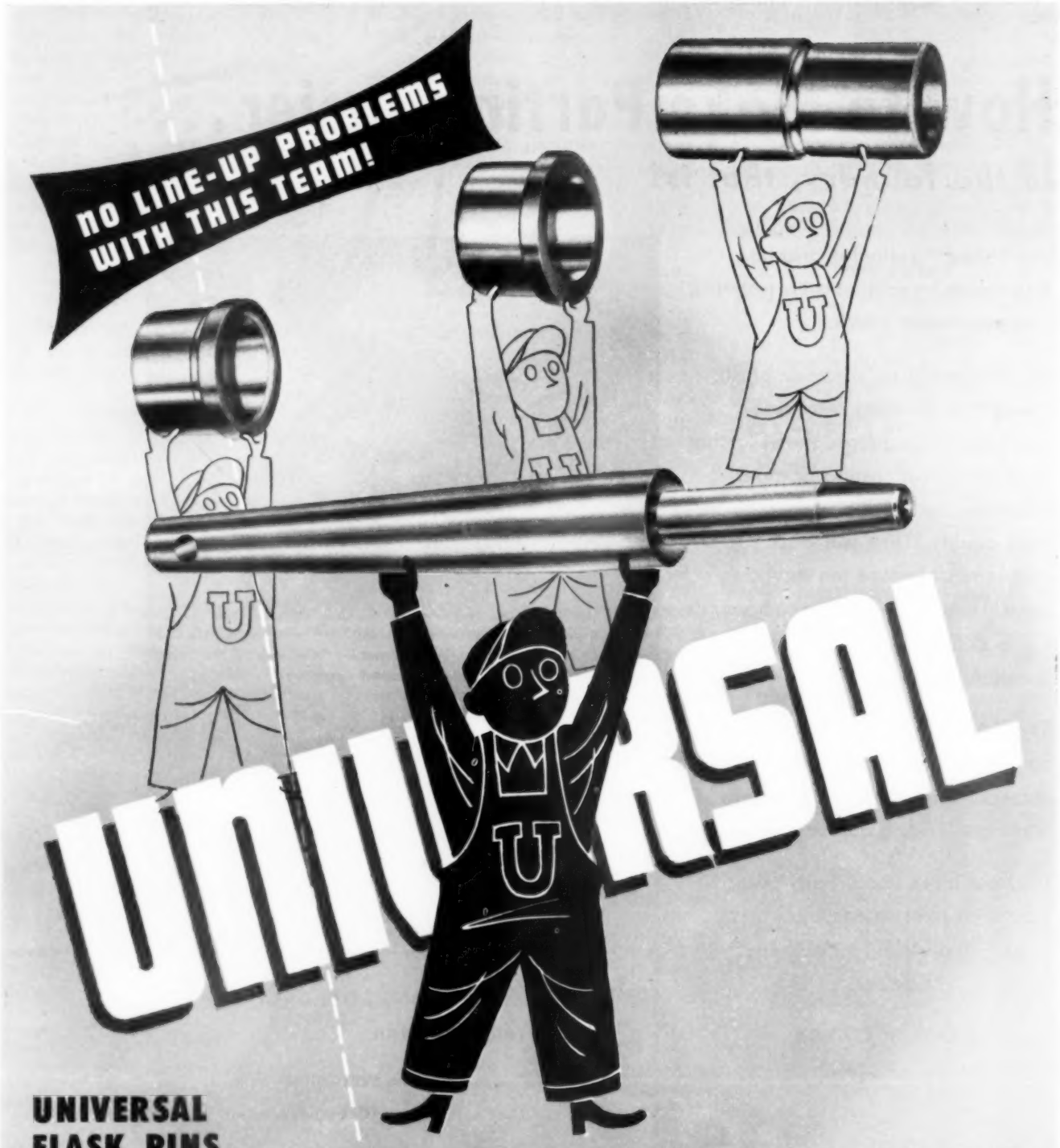

UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

(*Continued from page* 140)

there is not only the organization of the various member groups throughout the country, but an extensive program of industry promotion and the development of broad technical activities.

Stressing the importance of gray iron, he pointed out that it represents approximately 78 per cent of all castings produced and around 83 per cent of all ferrous castings. But, he said, the industry has been backward in making known the merits of its product. "Make It Better With Gray Iron" is a slogan which should be backed up with pertinent facts concerning the use of gray iron and its application.

He discussed the development of the society's technical department, under the leadership of Charles O. Burgess. Managerial and organization problems must come first and it is to this phase that attention is being directed primarily at present. However, he envisions an exceptionally well rounded program two years from now—one that will enable gray iron foundries to more than hold their own with competing industries. Research will be developed as time goes on, along lines that can be interpreted in terms of practical application.—*Ben K. Price.*

Saginaw Valley

SAGINAW Valley Chapter of the AFS celebrated Saginaw Malleable Iron Night Dec. 2 at Fisher Hotel, Frankenmuth, Mich., with 200 members and guests present. Members of the staff of Central Foundry Division, General Motors Corp., Saginaw, Mich. (formerly Saginaw Malleable Iron Plant) were introduced individually by Norman J. Henke, Central Foundry Division, and a chapter director.

James H. Smith, Central Foundry Division, spoke on "The Need for Foundry Educational Programs." In his opinion the foundry industry is beginning to feel keen competition from other fields of metal fabrication. The industry must keep on its toes through educational programs which include the following:

1. Co-operation with colleges and universities in teaching important uses and applications of castings to engineering students.
2. Foundry educational programs for supervisory staffs of foundries.
3. Encouragement of engineering graduates to enter the foundry industry.—*Kenneth H. Priestley, Vassar Electroloy Products Inc.*

Central New York

EIGHTH annual Christmas party of Central New York Chapter of the AFS was held Dec. 11 at Onondaga Hotel, Syracuse, N. Y. Party Chairman E. E. Hook, Dayton Oil Co., Syracuse, welcomed the 240 members and guests who attended and turned the evening's events over to his committee, consisting of J. O. Ochsner, D. Dudgeon, F. Wheeler, J. Ogden, J. Kratz, W. Dunn, B. Artz, J. Livingston and J. A. Feola.

TRI-STATE Chapter of the AFS met at Wilder's Dining Room, Joplin, Mo., Nov. 19. At top, left to right, are: C. A. McNamara Jr., Big Four Foundry Inc., Tulsa, Okla., chapter vice chairman, and L. L. Clark, assistant metallurgist, Buick Division, General Motors Corp., Flint, Mich., speaker of the evening

The program consisted of an old-fashioned turkey dinner, entertainment and drawing for a large variety of door prizes. A group of fiftee.i

(*Continued an page* 146)

SAGINAW VALLEY Chapter of the AFS celebrated Saginaw Malleable Iron Night, at the Fisher Hotel, Frankenmuth, Mich., Dec. 2. Speaker of the evening was James H. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich. He is shown at left. Below at left is a view of the speakers' table. Left to right, are: Norman J. Henke, Central Foundry Division; Howard H. Wilder, Eaton Mfg. Co., Detroit; William G. Mixer, Buick Motor Division, General Motors Corp., Flint, Mich.; Marshall V. Chamberlin, Dow Chemical Co., Midand, Mich., and Myron O. Booth, Central Foundry Division. Lower right is a view of some of the members of Central Foundry Division who were present for the celebration

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THE OSBORN MANUFACTURING COMPANY
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N OSBORN MOULDING MACHINE

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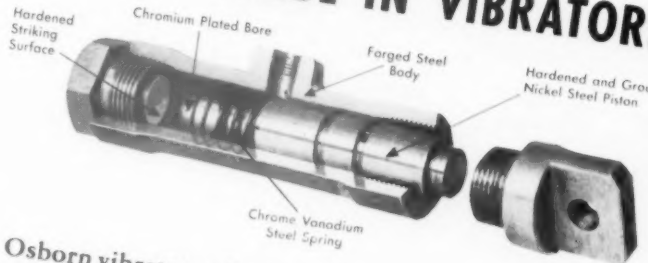
THE six accessories pictured on this Osborn Jolt Squeeze Moulding Machine are standard equipment considered essential to efficient operation. All were designed by Osborn engineers—manufactured by skilled Osborn workmen.

This overall control of design and manufacture applies to 95% of all parts making up Osborn Moulding Machines. It is your assurance that improved design will be applied whenever warranted and that the quality of each and every part measures up to Osborn's high performance standards.

A TOP VALUE IN VIBRATORS



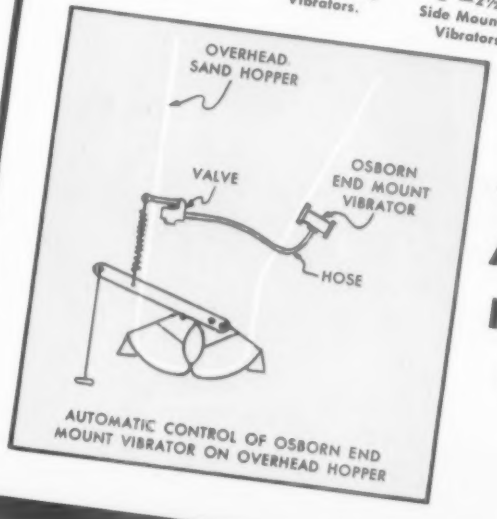
Osborn vibrators offer greater power in proportion to size; lighter weight at no sacrifice of strength; economy in air consumption; increased resistance to wear; maximum durability and freedom from sticking. This complete line of vibrators as well as other accessories pictured here may be purchased separately for other foundry uses.

⅜"—¾"—1" End Mounting Vibrators for Match Plate use.

1"—1¼"—1⅝" Side Mounting Vibrators.

2"—2½" Side Mounting Vibrators.

2"—2½" End Mounting Vibrators.



AUTOMATIC CONTROL OF OSBORN END MOUNT VIBRATOR ON OVERHEAD HOPPER

HERE'S ANOTHER USE FOR OSBORN VIBRATORS

OSBORN

MOULDING MACHINES

CORE BLOWING MACHINES

MEMBER MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

(*Continued from page* 143)

men from Hallstead Iron Co., Hallstead, Pa., won the distinction of having traveled the greatest distance to the party.—*J. A. Feola, Crouse Hinds Co.*

Central Illinois

WITH the thought of stimulating interest in the foundry industry in the chapter area, an exhibit was prepared and set up, from Dec. 3 to 10, in the Commercial National Bank, Peoria, Ill., by Central Illinois Chapter of the AFS.

The exhibit was designed to show the evolution of a casting from the blueprint stage through the master pattern, metal pattern equipment, mold, rough casting with riser and gates intact, and finished casting, as well as representative castings in malleable iron, brass, aluminum and gray iron produced by various foundries which are members of the local chapter.

Each casting was identified only as to type of casting and use, having no mention in the exhibit of any foundry or firm name. Placards also were displayed giving many pertinent facts regarding the foundry industry in Illinois.

The exhibit is now set up at the Peoria Vocational School where machine shop and foundry training are taught. The chapter plans to move the exhibit to as many high schools in the area as care to display it, as well as other places where it will create interest and build good will for the industry.

The regular December technical meeting for the Central Illinois Chapter was dispensed with in lieu of our third annual Christmas Party and Ladies' Night, which was held at the American Legion Hall, Peoria, Dec. 11. Approximately 325 members and guests had their fill of turkey with all the trimmings and then thoroughly enjoyed a five act vaudeville show. Our general chairman for the event, W. G. Schuller, Caterpillar Tractor Co., very capably handled all the details and is to be commended on the huge success of the party.—*V. W. Swango, Caterpillar Tractor Co.*

CENTRAL ILLINOIS Chapter of the AFS sponsored an exhibit of malleable iron, brass, aluminum and gray iron castings produced by member foundries of the chapter. It was shown in the Commercial National Bank, Peoria, Ill., from Dec. 3 to 10 and will be set up in high schools and other public places

Pittsburgh

CLYDE A. Sanders, engineer, American Colloid Co., Chicago, addressed the Pittsburgh Foundrymen's Association at its Nov. 15 meeting at the Fort Pitt Hotel, Pittsburgh.

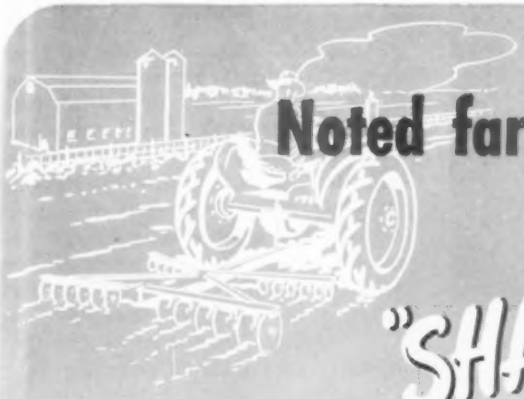
In discussing the use of naturally bonded sands versus synthetic sands, Mr. Sanders pointed out there is a place for both types and the most essential point is proper control of each. A foundry using naturally bonded sand should not be termed "old fashioned," as without proper handling and mulling equipment, synthetic sand should not be used in the average foundry. The less "know how" in the foundry should favor use of naturally bonded sands since the bond and sand grain are a unit and there is less danger of making mistakes than when blending synthetic sands. However, with a mechanized or semi-mechanized unit, synthetic sands offer the greatest economy and are the easiest to control and maintain standard physical properties with less mechanical maintenance.

Whether synthetic sands or naturally bonded sands are used, it is better economically to occasionally add a mineral bond to maintain proper green, dry and fired strengths. It requires about 12 per cent fire clay to obtain the same strength as 4 to 5 per cent western or southern bentonite.

Although the cheapest ingredient added to sand is moisture, it is also the most expensive. It is best to use the standard foundry slogan, "use the weakest, driest and finest sand that will make a good casting." Naturally bonded sands should use moisture content not in excess of 7 per cent. Fire clay bonded synthetic sands should not exceed 5 per cent moisture and bentonite bonded sands should not exceed 3.5 per cent moisture content.

It has been found that a wide grain distribution is better than irregular

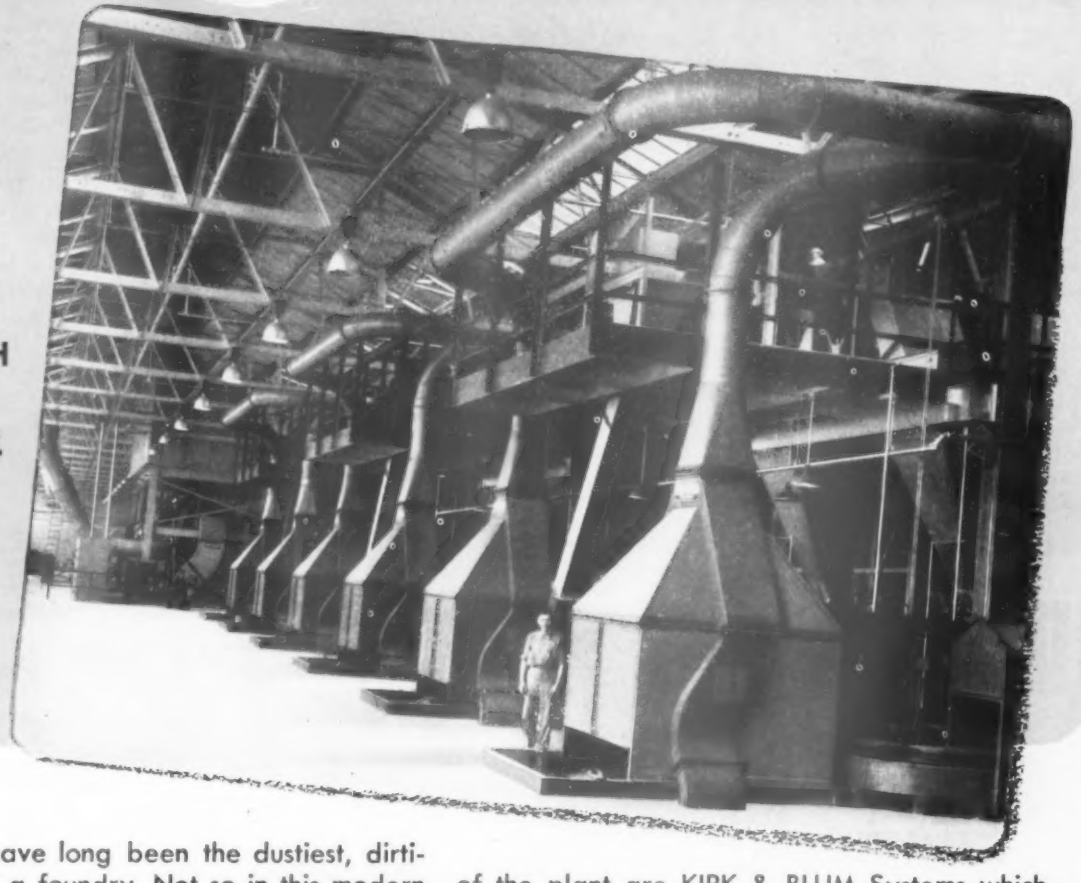
(*Continued on page* 148)



Noted farm equipment manufacturer

"SHAKES" DUST PROBLEM!

"SHAKE-OUTS" EQUIPPED WITH KIRK & BLUM DUST CONTROL SYSTEM . . .



Shake-outs have long been the dustiest, dirtiest section of a foundry. Not so in this modern plant. Kirk & Blum installed these efficient "over-and-under" hoods which collect dust as it is released in the shake-out operation. In the photo above, six of the shake-out stations are seen. Piping is designed to meet AFA standards; note the cleanout doors and gasketed companion angle connections.

This installation is one of a number in the modern southern foundry of one of the world's largest farm implement makers. In other parts of the plant are KIRK & BLUM Systems which remove fumes, dust and chips from various operations.

From this and thousands of other installations in widely varying industries, KIRK & BLUM has gained great skill and knowledge, based on 40 years experience. This experience is at your service. Write for booklet, "Dust Collecting Systems in Metal Industries." The Kirk & Blum Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM
DUST CONTROL SYSTEMS

NORTHWESTERN PENNSYLVANIA Chapter of the AFS met Oct. 25 at the Moose Club, Erie, Pa., with some of those who attended shown here

(*Continued from page* 146)

distribution. The wide spread of grains should be uniform and not irregular, or the distribution will be as bad as a three-screen sand. Greater density is obtained with widely distributed sand grains of proper sequence and castings obtain better finish.

Slides were used to indicate casting defects. In general, Mr. Sanders stated that scabs, buckles, and rattails, which are due to sand expansion, can be greatly overcome by small additions of wood flour and cereal and by increasing the green strength slightly. Defects such as cuts and washes are more rapidly overcome by increase in the green compression and harder ramming. Cracked castings due to molding conditions are more easily overcome by selecting a correct bond, such as Southern bentonite and combining it with wood flour or other materials that furnish collapsibility.

The association held its annual Christmas party at the William Penn Hotel, Dec. 20.—*Joseph C. Sullivan.*

CENTRAL OHIO: These are views of the Nov. 8 meeting of Central Ohio Chapter of the AFS held at Chittenden Hotel, Columbus, O. Photos are by courtesy of W. H. White, Jackson Iron & Steel Co.

Chicago

CHICAGO Chapter of the AFS initiated its 1949 activities on Jan. 3 with a program featuring four roundtable sessions. Some 200 members and guests convened for dinner and the meeting in the quarters of the Chicago Bar Association.

Chapter President Chester K. Faunt, works manager, Christensen & Olsen Foundry Co., Chicago, presided, assisted by Vice President W. D. McMillan, metallurgist, McCormick Works, International Harvester Co., Chicago.

The Nonferrous division sponsored one roundtable on the subject of "Aluminum Founding." Speaker was Albert Retis, manager, Stanal Aluminum Foundry Co., Chicago, and Martin G. Dietl, nonferrous metallurgist, Crane Co., Chicago, was chairman.

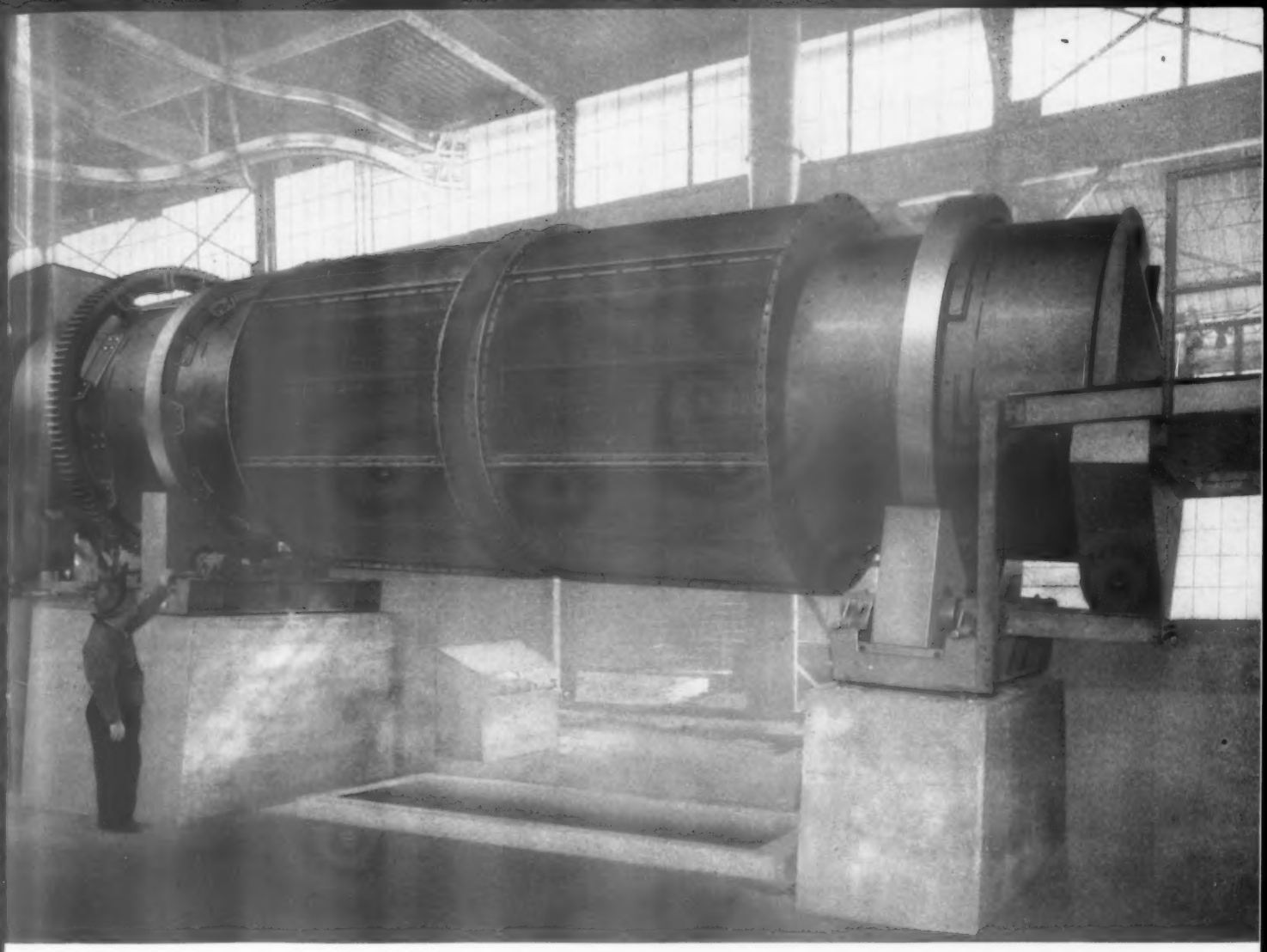
Gray Iron and Pattern divisions collaborated in a second roundtable to explore the topic "What I Want in a Pattern." A. C. Den Breejen, superintendent, Nichol-Straight Foundry Co., Chicago, was the speaker, and Joseph J. Schallerer, proprietor, Calumet Pattern Works, Chicago, served as chairman.

Third roundtable was conducted by the Steel division on the subject of "The Effect of Additions on the Fundamentals of Steelmaking — Ladle versus Furnace." The "furnace" approach was presented by C. F. Christopher, in charge of steelmaking practice, Continental Foundry & Machine Co., East Chicago, Ind., and the "ladle" angle was expounded by P. J. Neff, research metallurgist, American Steel Foundries, East Chicago, Ind. Richard E. Kerr, metallurgist, Pettibone Mulliken Corp., Chicago, and Eugene H. Weak, superintendent of electric furnaces, American Steel Foundries, East Chicago, Ind., served as joint discussion leaders.

In the fourth roundtable, conducted by the Malleable division, the topic was "New Foundry Horizons," with R. L. McIlvaine, vice president and sales manager, National Engineering Co., Chicago, showing a movie. Chairman of this session was R. P. Schauss, sales engineer, Illinois Clay Products Co., Chicago.

In their discussion of effects of additions in steelmaking, Mr. Christopher and Mr. Neff were in agreement that additions are more effective when added to the ladle. Mr. Christopher said "do not deoxidize in the furnace when it can be done in the ladle," and pointed out that the exception is when large additions

(*Continued on page* 150)



It cools and screens hot shakeout sand

THE Bartlett-Snow Rotary Sand Cooling Screen pictured above (with dust hood and collecting hopper removed) handles about 135 tons per hour of hot shakeout and returned spill sand, in a large grey iron production foundry, reducing sand temperatures 25° to 50°F. preliminary to storing and mulling. The shell is 72″ in dia. by 28′ long, trunnion mounted, double jacketed and girt gear driven.

Incoming sand passing into the 10 foot breaker section is raised and dropped by lifting flights, breaking up the core lumps so effectively that little waste sand passes through to the tote box.

The fines pass through two double jacketed screening sections, each 6′ long, and discharge into a collecting hopper feeding to a belt conveyor. The dust hood is so mounted over the screen that air can be drawn in from the sides as well as through the ends of the screen, assuring dust-free operation and efficient cooling.

This screen is only one unit in a complex foundry completely engineered and installed by Bartlett-Snow . . . with molding, pouring, shakeout and cleaning operations synchronized so accurately that metal from the cupola is loaded into freight cars as inspected casting 1¼ hours after pouring.

Let the Bartlett-Snow foundry experts with their intimate familiarity with the needs of practical day after day foundry operation,—work with you on your next sand, mold, or castings handling problem. The C. O. Bartlett & Snow Company, 6200 Harvard Avenue, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

BARTLETT-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

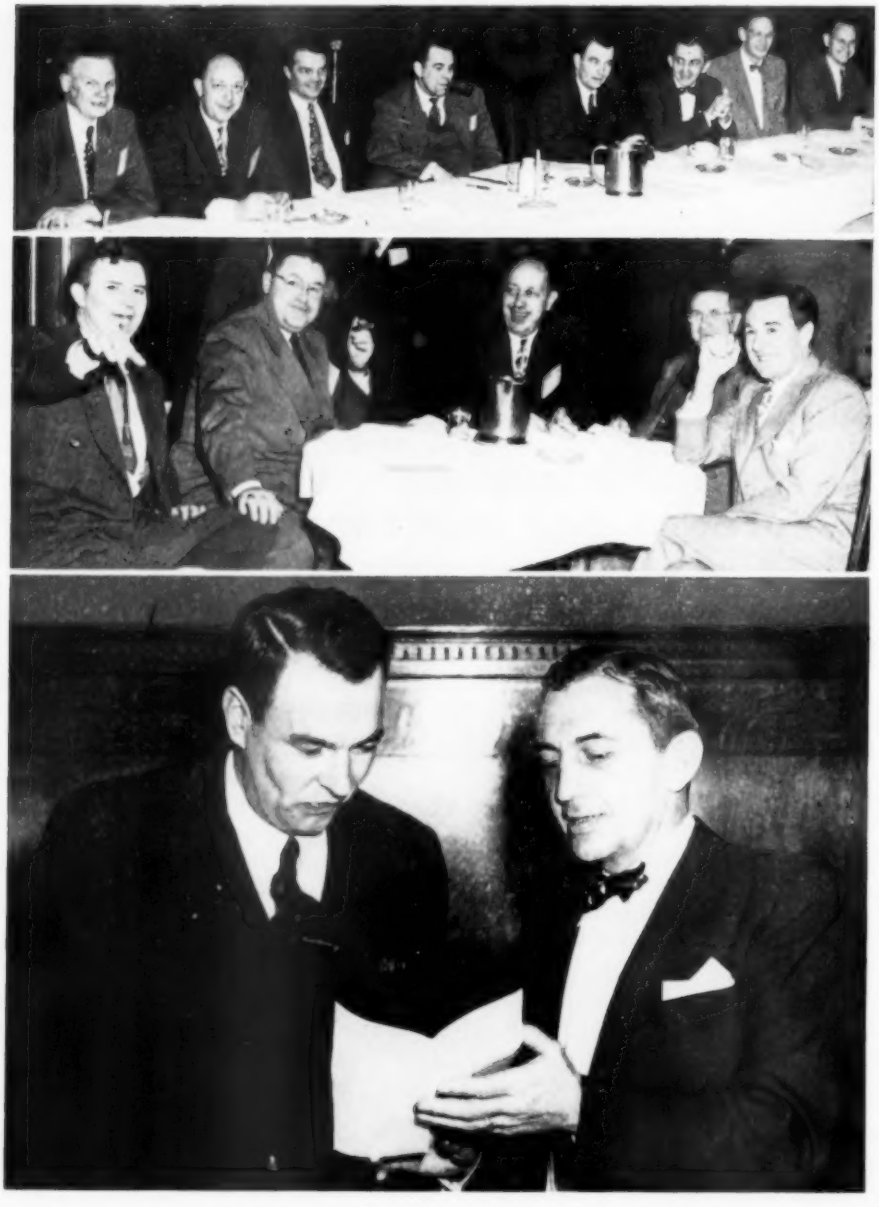
(*Continued from page* 148)

must be made. He stated that silicon becomes more potent as the metal temperature drops, thus its effectiveness is increased when the element is added in the ladle. Mr. Neff asserted that in some cases, additions to the ladle may cause a drop in metal temperature. Manganese, he said, must be added quickly, else some of it may be lost in the slag. Discussion revealed that aluminum additions can be treacherous, but the steelmaker cannot get along without this element.

The movie shown to the malleable group illustrated the effective use of mechanical equipment in Moline Malleable Iron Co., St. Charles, Ill. Striking difference between the amount of physical labor required in a non-mechanized foundry and in the well-equipped Moline plant was stressed with the various operations in the two being compared.

Next regular meeting of the chapter will be on Feb. 7, with roundtables again highlighting the program. Three of these will be sponsored by the Nonferrous, Gray Iron and Steel divisions; the Malleable and Pattern divisions will combine in the fourth.

Announcement was made that the chapter's annual Ladies' Night party will be held Feb. 19 at the Palmer House, Chicago.—*Erle F. Ross and Howard C. Tuttle.*



CENTRAL INDIANA Chapter of the AFS met Dec. 6 at the Athenaeum, Indianapolis. Bottom left shows George Anselman, foundry superintendent, Woodruff & Edwards Inc., Elgin, Ill., speaker of the evening. S. F. Swain, Golden Foundry Co., Columbus, Ind., chapter technical chairman, is at right

Central Indiana

MEMBERS and guests of the Central Indiana Chapter of the AFS heard a thorough and interesting talk on "Castings Defects in the Foundry," by George F. Anselman, foundry superintendent, Wooduff & Edwards Inc., Elgin, Ill., at its monthly meeting, Dec. 6, in the Athenaeum, Indianapolis. S. F. Swain, secretary and treasurer, Golden Foundry Co., Columbus, Ind., served as technical chairman for the meeting which was preceded by a dinner.

Mr. Anselman illustrated his talk with a set of projected slides, which pointed out in detail, various flaws and defects common to castings. As each slide was shown he interrupted his talk to permit questions and discussion. The speaker covered the proper mixing of sands, the use of various bonding agents and proper placement of chaplets, as being vital elements in proper casting procedure. He drew attention to the dangers of lumps in cereal binders and gravel particles in molding sand.

A business meeting of the chapter directors was held just prior to the dinner. — *William K. Mitchell.*

Wisconsin

WISCONSIN Chapter of the AFS met at Hotel Schroeder, Milwaukee, Nov. 12, with 242 members and guests present to hear W. R. Jennings, foundry manager, John Deere Tractor Works, Waterloo, Iowa, talk on "The Why, When and How of Foundry Equipment."

He claimed that foundries are far behind other sections of the metals industry in mechanization. While labor is being paid $1.50 to $2 or more per hour, only a few cents per hour are being paid by the average foundry for labor saving machinery. In this push-button age a great many more labor-saving devices must be installed to keep foundries on a paying basis, according to Mr. Jennings.

He added that a good place to start mechanization in a foundry is in the handling of the raw material in the foundry yard.—*John E. Hubel.*

Metropolitan

ON Dec. 10, the Metropolitan Chapter of the AFS held its annual Christmas Party at the Essex House, Newark, N. J.

Approximately 500 sat down to a very enjoyable dinner. After dinner, about 100 door prizes were given to the lucky foundrymen, who held the winning ticket numbers. After the drawing of the prizes, an entertain-

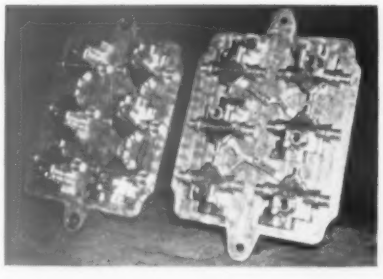
(*Continued on page* 152)

IPW HELPS YOU GET IT!

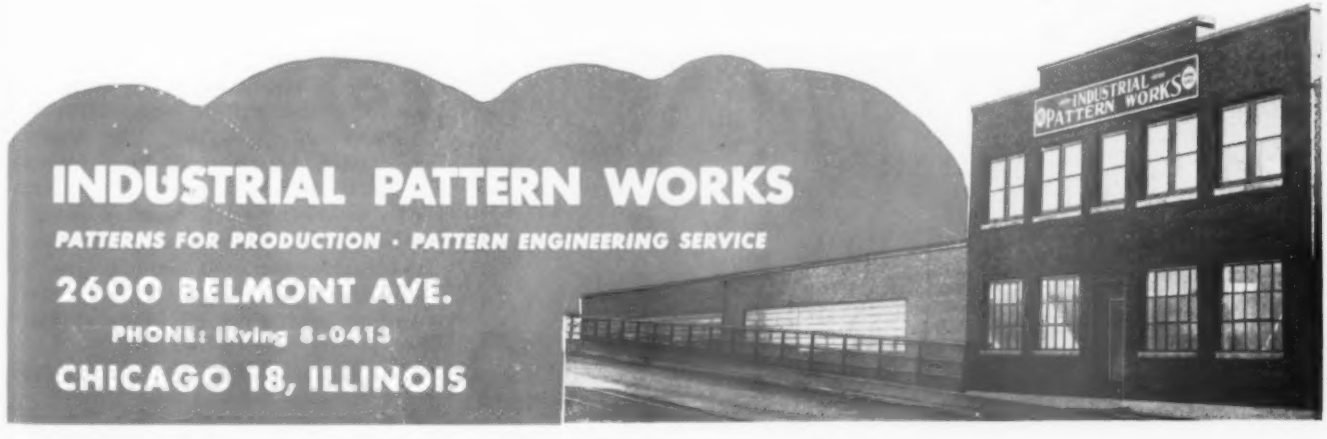
The savings in time and scrap that foundrymen strive to achieve through careful sand and metallurgical controls are frequently wasted because of poor pattern control.

Sound pattern control simply means the use of IPW all-machined, properly engineered, high precision patterns that produce dimensionally accurate castings. It also means a sharp reduction in foundry time and machine time—in foundry scrap and machine scrap. It means faster production, better work, better profits. Precision patterns give you an edge competitively, too, because high production brings down costs and prices.

IPW invites your inquiry. We'd like to show you how to cut down those costly, day-after-day scrap and machine time losses. Write today.



Typical all-machined pattern. This one consists of six brass patterns mounted on cope and drag steel plates.



INDUSTRIAL PATTERN WORKS

PATTERNS FOR PRODUCTION · PATTERN ENGINEERING SERVICE

2600 BELMONT AVE.

PHONE: IRving 8-0413

CHICAGO 18, ILLINOIS

(*Continued from page* 150)

ing floor show was presented.

A great deal of credit for success of the affair should be given to Harold Beckman, president, the Springfield Facing Co., who was chairman of the entertainment committee. — *George Baer, Atlas Foundry Co.*

Twin City

MONTHLY technical meeting of the Twin City Chapter of the AFS was held Dec. 2 at the Covered Wagon, Minneapolis. Ford R. Snyder, metallurgist, Hickman, Williams & Co., Chicago, addressed more than 100 members and guests on "Controlling Cupola Operations."

His talk dwelled on the basic steps necessary to start up and operate the cupola successfully and efficiently. Use of a standard practice instruction sheet was recommended. Any changes that are needed are first altered on the sheet and then tried in the operation of the cupola. Through this medium, any new ideas or developments can be evaluated properly.

Mr. Snyder suggested that proper control in cupola operations should begin with top management to be effective. Furthermore a properly qualified supervisor with ample authority should be placed in charge of cupola operations.

Case histories illustrating undesirable results of improper charging and consequent improvement when bad practices were corrected were cited.

The chapter held its annual Christmas party at Hotel Radisson, Minneapolis, Dec. 17, with more than 275 members and guests present. Following the buffet style dinner, five amateur boxing matches and a movie showing high lights of the 1948 Minnesota football games entertained the guests. Approximately 30 door prizes were awarded.—*J. D. Johnson and O. J. Myers, Werner G. Smith Co.*

TWIN CITY Chapter of the AFS met at the Covered Wagon, Minneapolis, Dec. 2, to hear Ford R. Snyder, metallurgist, Hickman, Williams & Co., Chicago, discuss "Controlling Cupola Operations." Lower photo shows speakers' table

Michiana

ALEXANDER BARCZAK, plant manager, Superior Foundry Inc., Cleveland, addressed 112 members and guests of the Michiana Chapter of the AFS Dec. 14 at Hotel LaSalle, South Bend, Ind. He spoke on "The Control of Synthetic Sand in a Production Shop."

The speaker discussed the history of sands and presented a comparison of the values of natural and synthetic sands. Progressing from the base sand, he proceeded step by step with treatments required to produce good results under various conditions. He explained in detail the effects upon sand through treatment with bentonites, clays, wood flour, etc.

He stressed as most important the preparation of sand and prescribed various rules, regulations and formulas for definite results in mixing sand. Castings made in sands prepared under formulas prescribed were exhibited.—*S. F. Krzeszewski, American Wheelabrator & Equipment Corp.*

Rochester

IN A meeting dedicated to patternmaking and held at Hotel Seneca, Dec. 14, Rochester Chapter of the AFS heard Ernest Kindt, president, Kindt-Collins Co., Cleveland, discuss "The Pattern Industry—Past, Present and Future Trends."

Mr. Kindt spoke of pattern engineering as a key industry. Presenting first a brief history of patternmaking, he claimed that the industry is still in its infancy, with many new developments to come. The plan of a new pattern shop and the selection and layout of equipment were discussed. The speaker mentioned the principles employed in figuring the cost of wood and metal patterns and the principles employed in selling patterns and pattern equipment.

He went on to say that standardization of draft, colors, plates, methods, and materials will be a big step forward for the patternmaking industry. Mr. Kindt also mentioned the engineering and manufacture of permanent molds and spoke of future applications of plastics and plaster in the pattern industry.

Following his talk and a discussion

(*Concluded on page* 154)

Carbon Monoxide

NO MENACE TO B&W REFRACTORIES

Twelve years of uninterrupted service is the record established by B&W Refractories in a continuous malleableizing furnace operating under high CO atmosphere.

Refractories previously used in furnaces of this type disintegrated rapidly due to the reaction between the prepared atmosphere and impurities in the brick. But with B&W Refractories, brickwork maintenance has been negligible.

Today, this furnace and five similar furnaces in the same plant—all equipped with B&W IFB linings and B&W 80 Firebrick piers—**are malleableizing 450 tons of castings a day without interruption!**

Equally important, the use of B&W Insulating Firebrick has helped to reduce cycle time from 72 hours—required in old type furnaces lined with heavy firebrick—to 30 hours. Significant fuel savings, and improved product quality through closer temperature control have also been achieved.

If you are looking for ways to increase your production and decrease your costs, the use of B&W Refractories in your furnaces will prove of assistance. Your local B&W Refractories Engineer will be pleased to discuss your problems with you.

R-324

B&W REFRACTORIES PRODUCTS

B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
B&W 80 GLASS TANK BLOCKS • B&W INSULATING FIREBRICK
B&W REFRACTORY CASTABLES, PLASTICS AND MORTARS

•

OTHER B&W PRODUCTS

Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers
Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

(*Concluded from page* 152)
period, Mr. Kindt presented a 1600-foot movie emphasizing highlights of his talk.—*G. M. Etherington, Gleason Works.*

Eastern Canada & Newfoundland

EASTERN Canada and Newfoundland Chapter of the AFS met Dec. 10 to hear C. E. Harrington, manager, sales engineering department, Meehanite Metals Corp., review a brief history of Meehanite. Two films were shown in connection with his talk. The first film, entitled "Flow of Metal into Molds," showed progressive solidification in the mold. The second film was entitled "Meehanite Means Better Castings."

W. T. Shute, Canadian Car & Foundry Co., Ltd., Longue Pointe, P. Q., and educational committee chairman, addressed the meeting in French and English, announcing the local apprentice contests and drawing attention to the annual competition, open to all members, for the best paper dealing with a technical subject on the foundry industry—*W. J. Brown, Robert W. Bartram Ltd.*

Texas

ON Tuesday, Dec. 7, at Maggie Parker Dining Hall, Bryan, Tex., William W. Maloney, national secretary-treasurer, AFS, presented the student chapter at A. & M. College with the traditional baby rattle, and officially proclaimed the inauguration of the chapter. Mr. Maloney stressed the opportunities for the young college graduate in the foundry industry.

Following Mr. Maloney's address, Lloyd Berryman, professor of metallurgy at the college, presented Mr. Maloney with a pair of cast bronze book ends cast by the students.

The meeting was attended by some 25 members of the Texas chapter and approximately 25 students and faculty members of the college, including Dean Barlow, dean of engineering. Professor Crawford, professor of mechanical engineering, welcomed the group and the society on behalf of the college. Jack Kline, Texas Foundries, Lufkin, Tex., and F. M. Wittlinger, Texas Electric Steel Castings Co., spoke briefly on various phases of the foundry industry as related to the engineering profession.—*W. H. Lyne, Hughes Tool Co.*

Connecticut Non-Ferrous

OFFICERS for the coming year were elected at the Christmas meeting of Connecticut Non-Ferrous Foundrymen's Association held Dec. 15 at Castle Restaurant, New Haven, Conn.

The officers, all of Connecticut, are: President—J. Joseph Shannon, Jenkins Bros. Co., Bridgeport; vice president—George S. King, New Haven; treasurer—Owen Johnson, H. B. Ives Co., New Haven; secretary—Louis G. Tarantino, Niagara Falls Smelting & Refining Division, New Haven, and technical secretary — Charles A. H. Knapp, R. Lavin & Sons, Clinton.

Chairman of the executive committee is S. H. Chappell Sr., Electric Boat Co., Groton. Committee members are: Walter J. Kenney, New Britain; D. Wesley Case, Belknap Mfg. Co., Bridgeport; J. Joseph Judge, Jenkins Bros. Co., Bridgeport, and H. A. Phelps, Knapp Foundry Co., Guilford.—*Louis G. Tarantino, Niagara Falls Smelting & Refining Division.*

Burgess Addresses Tool Manufacturers

C. O. Burgess, technical director, Gray Iron Founders' Society, was the principal speaker at the dinner meeting of the Dayton, O., chapter of the Tool Manufacturers' Association on Dec. 3. Seventy members and guests were present. The program was sponsored by George A. Kramer, the Advance Foundry Co.

Mr. Burgess talked on "Design of Castings and the Effect upon Tools and Dies." After discussing the technicalities of the subject, he emphasized the importance of consultation between the engineer and foundryman to avoid design complications.

The meeting also was addressed by J. J. Kohl, the International Tool Co., president of the National Tool Manufacturers' Association.

REGIONAL MEETING of the National Founders Association was held at the Garde Hotel, New Haven, Conn., Dec. 1. Twenty-five members from the first district (New England States) attended. Franklin Farrel III, Farrel-Birmingham Co., Ansonia, Conn., NFA president, and L. E. Roark, association executive vice president, addressed the group. Charles Wesson, Sargent & Co. Inc., New Haven, chairman of the first district, presided at the meeting. At the speakers' table, left to right, are: Ed Fries, NFA national office, Mr. Farrel and Mr. Wesson

Speedy handling of sand, molds and castings is very important to meet production demands. Jeffrey has the equipment — flask fillers, mold conveyors, aerators, crushers, screens, feeders — to do a complete mechanization job. It will help you broaden the profit margin all along the line. Quality equipment for quality castings.

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

907 North Fourth St., Columbus 16, Ohio

Baltimore 1 · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 13 · Denver 2 · Detroit 13 · Harlan · Houston 5 · Huntington 19 · Jacksonville · Milwaukee · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 3 · Salt Lake City 1 · Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment

JM

Man-to-Man

ON THE MOLDER'S BENCH

"The Advertising School"

By RALPH L. LEE

ONE of THE FOUNDRY advertising men was surprised and quite happy the other day when I told him that I not only looked at but read even the fine print in all our ads—and every month too. "How come?" he asked. "There must be an awful lot of the equipment and supplies we advertise you couldn't possibly use in that little pewee play foundry of yours." "Right you are," I said, "but you see, its due to a habit I picked up years and years ago when I was a kid."

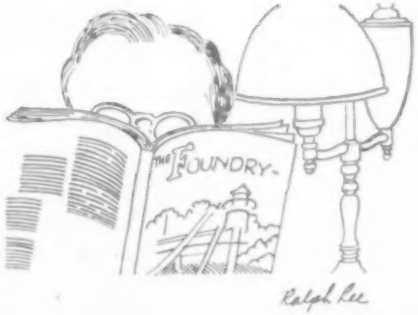
With practically no encouragement from him I told him about my Dad and his advice to me when I started out in the shop. "Look Son," Pop said, "here's what you ought to do—start now and gather together every catalog and piece of advertising about our business you can lay your hands on. And I'll tell you why."

"Now you take these texts and hand books they use in schools and colleges—the chances are the folks who write them don't work at the thing they write about. I know for a fact that I have been so busy working all my life I've never found time to write a book. But anyway," he went on, "these writers have got to run around from one place to another gathering up stuff to write about. By the time they've made the rounds, written up what they've learned, sent it to the printers, had books made and delivered all over creation—why—a good deal of the dope is out of date."

"But Son, on the other hand, you take manufacturers of our equipment and our suppliers who are running nip and tuck against competition—you bet your sweet life that the stuff they are putting in their ads and catalogs is going to be hot off the griddle. So that's why I say get hold of all the catalogs you can—read all the ads—and if you keep it up over the years you're going to get yourself a darned good education, and for almost nothing too."

As my advertising friend hurried away to catch a train he said he thought Pop had something and wished a lot more people got into the ad-studying habit.

I've been thinking since that maybe ad studying is more important to us in the foundry business than to those in almost any other trade or craft. For in spite of the terrific tonnage we turn out each year there aren't so many foundries when you add them all up—that is, compared with all the other kinds of shops and factories. Outside of a handful, most of our foundries aren't very big either, with the result that most of us can't afford experimental labs and research departments.



This is where our equipment manufacturers and suppliers get in their good licks for us. Since the field is relatively small they've got to be up on their toes working on new things all the time.

Just to check up again I've reviewed the advertisements in our last issue of THE FOUNDRY and I'd be willing to bet that there is a larger percentage of educational dope to ballyhoo than you will find in the rank and file magazine. While I'll have to admit that there is some gilding of the old lily going on in the ad writing, and just to be on the safe side it might be well to keep a salt cellar handy, just the same by checking each ad we are bound to be reminded of one thing after another going on in the place that needs looking into or definitely needs fixing.

By playing the claims of one ad against another we hit a happy medium, and we get wind of new methods and stuff in time to keep well ahead of the parade.

I know that I've picked up one sizable hunk of practical education from the ads alone. It wouldn't hurt a bit if we saw to it that more of the boys out in the shop got a crack at leafing through each issue of THE FOUNDRY. By the way, I didn't get a chance to tell my advertising friend that I usually read all the articles too.

another foundry reports...

"uniform sand quality... unbelievably low maintenance costs"

...using SIMPSON MIXERS

Illustrated below is a view of the two Simpson Intensive Mixers installed at the Omaha Steel Works foundry to provide better sand at lower cost.

OMAHA STEEL WORKS
STRUCTURAL STEEL - ORNAMENTAL IRON
STEEL CASTINGS - MACHINE WORK
609 SOUTH 48TH STREET
OMAHA, 6, NEBRASKA

December 10, 1946

National Engineering Company
549 West Washington Boulevard
Chicago 6, Illinois

Attention: Mr. L. G. Probst,
Foundry Engineer

Gentlemen:

It seems proper on this, the third anniversary of our operation of our new steel foundry unit, to compliment you and to thank you for the efficiency of the sand handling system that you installed in our plant.

As you will recall, at the time we authorized the installation, we already had in our old foundry a Simpson Mill; and, while we were pleased with the performance of the old mill, we foresaw the greater efficiency of the new Simpson Mills that you recommended. We have not been disappointed. The quality of our sand mixes has been uniform, and our maintenance costs have been low. In fact, the maintenance costs of the whole sand handling system have been unbelievably low.

We have not tried for any record in reducing the amount of new sand used as we have often felt that, if this is overdone, the cleaning room costs raise and offset the economy in sand consumption. We can say, however, that during the three years of operation of the new foundry our percentage of loss of castings from all causes has been less than 1/2 of 1 percent.

Again we express our appreciation to you for a job well done.

Yours very truly,

OMAHA STEEL WORKS

Paul H. Leussler

Paul H. Leussler
Vice President

PHL:gg

ALL ORDERS ARE ACCEPTED SUBJECT TO STRIKES, ACCIDENTS, CAR SUPPLY AND OTHER CAUSES OF DELAY BEYOND OUR CONTROL.

The Omaha Steel Works is only one of many up-to-date foundries that *depend* on Simpson Mixers and National Sand Handling Systems for *high output* of completely uniform sand mixes. Low operating and maintenance costs add appreciably to the satisfaction that Simpson Mixers give their owners.

National Engineering and Field Service is available to help solve your sand handling problems. Write for complete details.

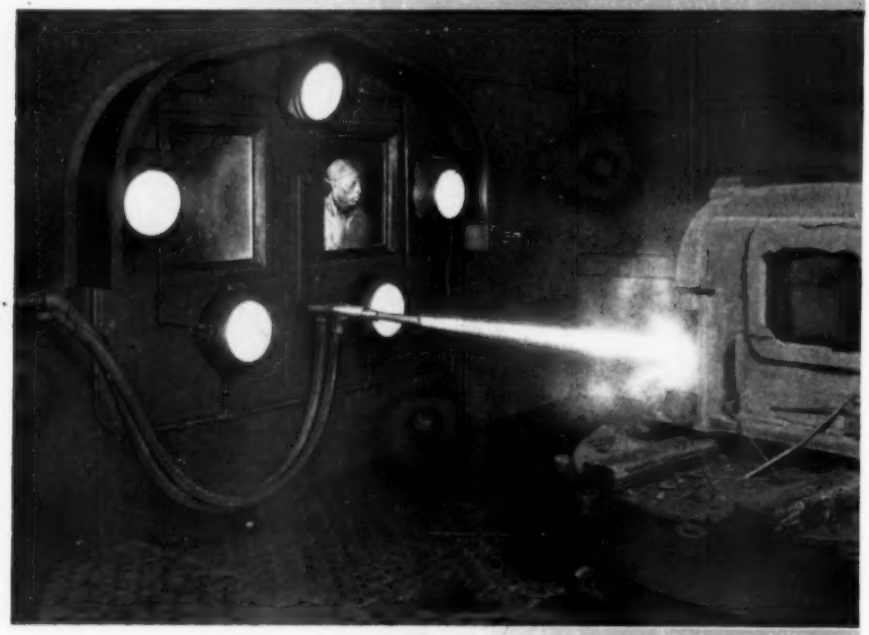
NATIONAL ENGINEERING COMPANY

608 MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

Blast Clean & Remove Cores in ONE operation



Pangborn Hydro-Sand Blast

Here's the economical, clean, easy, safe way to remove cores and blast clean in one operation with only one man . . . Pangborn Hydro-Sand Blast and Core Knockout.

This modern installation propells a high-velocity stream of sand and water that blasts, cuts and cleans. Work rotates on a controllable table inside a self-contained steel plate room while the operator manipulates the blast stream from outside. There's no dirt or dust. It's a cleaning room that keeps itself clean and greatly reduces dust from other operations in adjacent areas.

With this Pangborn Hydro-Sand Blast and Core Knockout, you recover core sand and reclaim core rods without sledge damage. Your subsequent roughing, chipping and finishing operations become faster, cheaper jobs because of the efficiency and thoroughness of this machine.

Hydro-Sand Blast Rooms are custom-engineered . . . tailored to your individual requirements to give you faster, better, cheaper blast cleaning. For complete information write for *free* bulletin No. 1100 to PANGBORN CORPORATION, 2300 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control Equipment.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

OBITUARY

JOSHUA A. CREW, 60, retired vice president, Ayers Mineral Co., Zanesville, O., died Dec. 31. Mr. Crew, a native of Zanesville, was graduated as a metallurgical engineer from Ohio State University in 1911, and became chief metallurgist, the Illinois Steel Co., Gary, Ind. In 1919 he took a similar position with Pittsburgh Steel Co., Monessen, Pa., returning to Zaneseville 3 years later to join Ayers Mineral Co. In 1943 he became vice president in charge of operations of the company's Glass Rock, Millwood, and Blissfield, O., and Lexington, Tenn., plants, retiring last June because of poor health. Mr. Crew during many years of service, became widely known in the foundry, ceramic and glass industries.

* * *

Charles H. Gallmeyer, 68, since 1933 president of Gallmeyer & Livingston Co., Grand Rapids, Mich., machine and tool manufacturer, died Dec. 31. One of the founders of the company which bears his name, Mr. Gallmeyer was also a director of the Wolverine Brass Works, Grand Rapids. A native of Grand Haven, Mich., he became a partner in Davidson-Gallmeyer Lumber Co., Toledo, O. in 1908. He sold his interest there in 1912 and returned to Grand Rapids as treasurer of Valley City Machine Works. In 1923 this company merged with Grand Rapids Grinding Machine Co. and the Union Machine Co., to form Gallmeyer & Livingston Co., Mr. Gallmeyer being named treasurer.

* * *

Marvine Gorham, 78, retired Buffalo representative of Michigan Steel Castings Co., Detroit, died Dec. 21, at his home in Buffalo. Mr. Gorham was born in Buffalo and was graduated from Massachusetts Institute of Technology in 1893. He was secretary-treasurer, Schweppe & Wilt Mfg. Co., Detroit, for 18 years prior to returning to Buffalo.

* * *

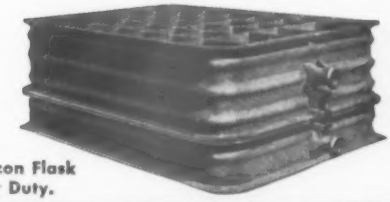
Victor L. Mahler, 67, for over 25 years vice president, Empire Brass Co., Cleveland, died recently. Mr. Mahler retired from the company in 1942 due to ill health.

* * *

Ross C. Purdy, Columbus, O., well known ceramic engineer, died Jan. 6. Mr. Purdy's early work at University of Illinois was in connection with development of paving brick. He became a leading educator in the ceramic field and was a member of the American Ceramic So-

(*Concluded on page* 160)

Model TM-10 Truscon Flask for Two-Man Handling.



Model CH-40 Truscon Flask for Extra Heavy Duty.

HEADQUARTERS

FOR FOUNDRY FLASKS AND MATERIALS HANDLING EQUIPMENT

THE SUCCESS of modern foundry methods depends upon the efficiency with which materials and products in various stages of fabrication can be handled.

Truscon's Pressed Steel Division—nationally known for the quality of its products and the dependability of its service—is fully equipped and prepared to handle your foundry flask and materials handling requirements. The Pressed Steel Division's central location assures efficient service for your needs. Write for free catalogs describing Truscon Steel Foundry Flasks and Steel Boxes.

TRUSCON

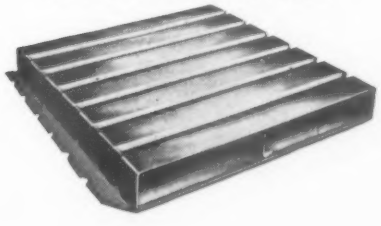
Model OM-1 Truscon Flask for One-Man Handling.

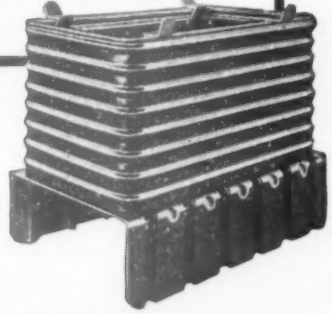
STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVE.
CLEVELAND 4, OHIO
Subsidiary of Republic Steel Corporation

Type PB-650 Truscon Box and Platform with sliding End Door.

Type PB-120 Truscon Steel Box and Platform.

Truscon Double Face Steel Pallet.





Type PB-120T. Truscon Steel Box and Platform with Tiering Lugs.

They Like . . .

MANHATTAN CUT-OFF WHEELS

at Empire Steel Castings

Faster Cutting . . . More Cuts per Wheel

That's the story of Manhattan Cut-Off Wheels on this Tabor machine in the plant of the Empire Steel Castings Co. at Temple, Pa. The operator photographed above is cutting off riser and gate on a high alloy stainless steel casting for a pressure valve insert. In the foreground, you see the valve insert before the cut-off operations. 16" x ⅛" Manhattan Cut-Off Wheels give most satisfactory service, according to Empire cleaning shop foreman. "In fact they wear down so evenly we are able to use them in their reduced size for a lot of little grinding jobs around here."

Developments in both rubber and resinoid bonds have greatly increased the number of cuts per wheel, and improved the quality of cut. Manhattan Cut-Off Wheels are "pay-off" wheels. Be sure to try Manhattans in your foundry and prove them for yourself.

ABRASIVE WHEEL DEPARTMENT

RAYBESTOS-MANHATTAN INC.

MECHANICAL RUBBER PRODUCTS — RUBBER COVERED EQUIPMENT — FRICTION MATERIAL — ASBESTOS TEXTILES
PACKINGS — POWDERED METAL PRODUCTS — ABRASIVE & DIAMOND WHEELS — BOWLING BALLS

MANHATTAN RUBBER DIVISION PASSAIC, NEW JERSEY

(*Concluded from page* 158)

ciety for more than 50 years, serving as its secretary from 1920 to 1946. Prior to that he was associated with Norton Co., Worcester, Mass., for about 7 years.

Deuscher Co. Marks 70th Anniversary

A story of success in the gray iron casting industry was unfolded recently when the H. P. Deuscher Co., Hamilton, O., celebrated its 70th anniversary. The company had its beginning in 1878, when Henry P. Deuscher acquired controlling interest in the Variety Iron Works, which had been operated in Hamilton by Indianapolis interests. Mr. Deuscher, born in Baden, Germany, in 1829, came to America at the age of 7. He followed agricultural pursuits before and after service in the Army during the Civil War, until 1878 when he purchased the iron works.

The Deuscher company first produced small castings and later farm implements. In 1893 the Cincinnati Heating & Ventilating Co. was acquired and production of the Deuscher hot air furnace was begun. Since Henry P. Deuscher, the founder, died in 1903, principles instilled by him during 25 years of leadership, have been carried out. In 1910 the plant and foundry was entirely destroyed by fire and a new foundry was completed the following year, equipped to specialize solely in production of gray iron castings.

Present officers of the company include: Clarence D. Ehresman, president; Herbert O. Ehresman, vice president; Earl H. Thompson, secretary-treasurer; Paul L. Ziegler, general manager; John H. Pater Jr., superintendent; and Otto Humphrey, assistant superintendent.

Book Review

Manual of ASTM Standards on Refractory Materials, paper, 252 pages, 6 x 9 inches, published by American Society for Testing Materials, Philadelphia. Price $2.50.

This manual brings together conveniently and in their latest form some 40 ASTM standard and tentative specifications, classifications, methods of testing and definitions pertaining to refractories. Certain other pertinent information of value in testing and use of refractories also is included. These include a suggested procedure for calculating heat losses, suggested practice for use with ASTM panel spalling tests,

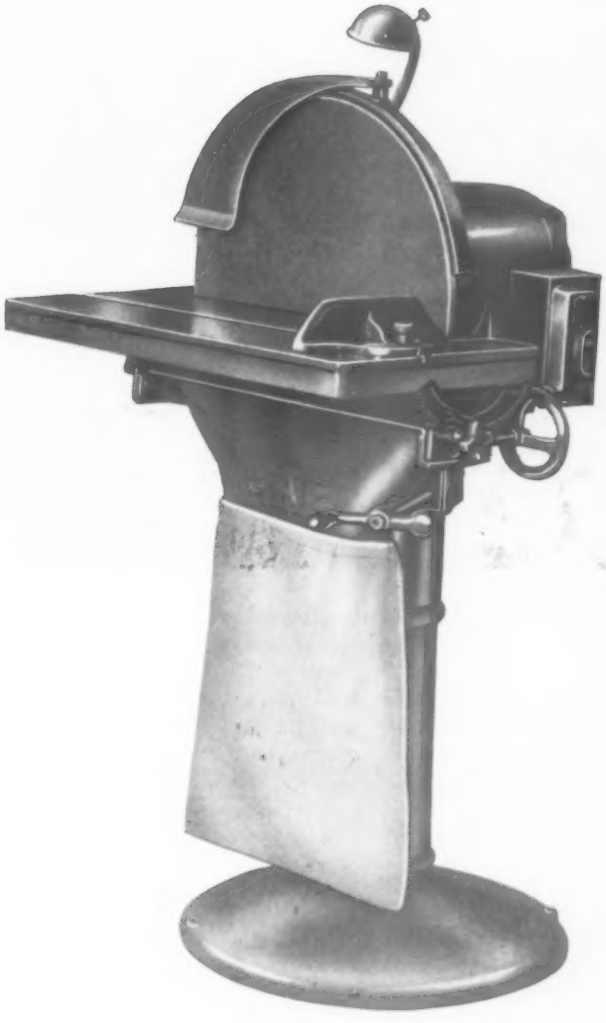
(*Concluded on page* 163)

NEW!

FREEMAN EQUIPMENT FOR YOUR PATTERN SHOP
20" DISC SANDER

WRITE FOR COMPLETE INFORMATION ON THIS NEW

STATE 20" DISC SANDING MACHINE



This moderately priced, precision built, quality machine offered by THE FREEMAN SUPPLY COMPANY is another addition to the already famous line of STATE DISC AND SPINDLE SANDERS designed and built especially for the pattern shop.

REQUEST BULLETIN No. 49-1-5

Send us your inquiries on other equipment requirements.

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber

1152 E. BROADWAY TOLEDO 5, OHIO

1 2 3 4 5 6 7 8 9

JOIN THESE TOP EXECUTIVES

10 11 12 13 14 15 16 17 18

IN MAKING YOUR BUSINESS SECURE!

19 20 21 22 23 24 25 26 27

You're looking at the Industrial Advisory Committee for the United States Treasury Department. For the good of the nation's business generally—and of their own companies specifically—these men have been applying their talents and prestige all year to promoting sales of U. S. Savings Bonds via the Payroll Savings Plan.

They have sponsored the Plan in their own plants. They have made speeches, written letters, and boosted participation in the Plan among other companies in their fields. During the past 12 months, these industrial leaders have helped bring about the greatest surge in Payroll Savings participation. Now over 20,000 large companies have introduced this plan, and more than 7,500,000 employees are signed up for security. They are saving over $150,000,000 per month!

With their keen business vision and experience, these men fully appreciate how sales of Savings Bonds benefit everyone: the individuals who buy them, the companies that operate the Payroll Savings Plan, and the nation over-all.

Is your company getting its full share of the Plan's benefits? To find out, call your State Director, U. S. Treasury Department's Savings Bonds Division.

1 JAMES B. BLACK, *Pres., Pacific Gas & Electric Co.*
2 ALBERT BRADLEY, *Ex. V. P., General Motors Corp.*
3 EARL BUNTING, *Managing Director, National Assn. of Mfgrs.*
4 PAUL F. CLARK, *Chrm., Board of Dir., John Hancock Mutual Life Ins. Co.*
5 PHILIP R. CLARKE, *Pres., City Nat'l. Bank & Trust Co.*
6 MARTIN W. CLEMENT, *Pres., Pennsylvania Railroad*
7 FREDERICK C. CRAWFORD, *Pres., Thompson Products, Inc.*
8 JOSEPH WOOD EVANS, *Pres., Evans & Company*
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27 WALTER WHITE, *Asst. to the Chrm. of Business Advisory Council for Department of Commerce*

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

(*Concluded from page* 160)

petrographic techniques, data on standard samples for chemical analysis, pyrometric cone equivalent determinations, and industrial surveys of service conditions of refractories.

Book Review

1947 *Supplement to Book of ASTM Standards,* Part III-A Nonmetallic Materials, paper, 437 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $4.

This volume contains 68 revised standards and new and revised tentatives in the field of nonmetallic material—fuels, petroleum, aromatic hydrocarbons, soaps, water, and textiles which have been accepted since the appearance of the 1946 *Book of Standards* of the American Society for Testing Materials. The 13 standards are replacements of existing standards; similarly 27 of the 50 tentatives are replacements while the remaining 23 are published for the first time. Twenty-one tentatives adopted as standard in 1947 without revision are listed in the contents, but are not published in this supplement.

Yellow stickers accompany this supplement, for attachment to appropriate pages of the 1946 *Book of Standards,* Part III-A, to call attention to any standards which have been superseded by standards in this supplement, tentatives which have been adopted as standard without revision, and standards which have been withdrawn.

Offers Engineering Dictionary and Film

Industrial Engineering College, 3309 West Washington Blvd., Chicago 24, has published the *Industrial Engineering Dictionary* after five revisions and much research and collaboration with prominent management and industrial engineers. It contains over five hundred words, terms and phrases, and many abbreviations used in the profession. It is priced at $2.

The college also has produced a 16-mm sound and color film entitled "Mighty Labors" which answers the question, "What is Industrial Engineering?" It is designed for audiences composed of executives, foremen, key employees and school groups and covers fundamental economic factors before showing and explaining the several subjects under industrial and management engineering. The film runs 34 minutes and is available on a free loan basis.

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Read what John M. Price, president of one of the nation's largest and most successful automotive jobbing foundries writes about Coleman Ovens.

FERRO MACHINE & FOUNDRY INC.

PRODUCTION MACHINE SHOP AND TOOL ROOM — MANUFACTURERS OF FERRO GREY IRON CASTINGS FOR AUTOMOTIVE INDUSTRY

3155 EAST 68TH STREET
CLEVELAND, OHIO

August 31, 1948

The Foundry Equipment Company
1831 Columbus Road, N. W.
Cleveland 13, Ohio

Gentlemen:

Recently we hit some new production highs and would like to tell you that our Coleman Ovens have played a very important part in helping us turn out tonnages which a few years ago might have seemed impossible.

Our Coleman Tower Ovens have enabled us to double our production without adding a square foot of floor space to our core departments.

We have been using various types of Coleman Ovens since 1905. While we would rather not quote specific savings, we can tell you that our very large investment in Coleman Tower Ovens since 1944 is one of the most profitable equipment purchases we have ever made.

As one of the largest automotive jobbing foundries in the industry, we produce a type of work that requires many complex and delicate cores. Our Tower Ovens have proved to be unusually flexible, enabling us to turn out the large variety of cores we need with perfect results. Tremendously improved working conditions have enabled us to attract and hold better workers.

We are pleased to recommend Coleman Ovens and your company without reservation.

Sincerely

FERRO MACHINE & FOUNDRY, INC.

John M. Price
President

For lowest cost operation, whether your core production is as large as Ferro's or of a limited nature, it will pay you to investigate Coleman Ovens. Write today for Bulletin 48 which describes all types and sizes of Coleman Ovens.

The FOUNDRY EQUIPMENT C

CLEVELAND 13, OHIO, U. S. A

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

double production
for FERRO MACHINE & FOUNDRY INC.

This Coleman Tower Oven at Ferro is one of the world's largest. It bakes 18,000 lbs. of cores per hour

Coleman Tower Oven baking Ford V-8 Cylinder Head Cores at Ferro. Load second floor, unload first floor.

One of Ferro's highly mechanized core departments served by Coleman Tower Ovens

Feeder Conveyor serves one of several Coleman Tower Ovens in another Ferro core department.

One of Ferro's many Coleman Horizontal Conveyor Blacking and Paste Drying Ovens.

OTHER LARGE USERS OF COLEMAN OVENS PRODUCING AUTOMOTIVE, TRACTOR, AND FARM MACHINERY CASTINGS

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Wilson Foundry & Machine Co.
Lynchburg Foundry Co.
Lakey Foundry & Machine Co., Inc.
International Harvester Co.
Minneapolis-Moline Power Imp. Co.
Studebaker Corporation

General Motors Corporation
Cadillac Foundry Div.
Chevrolet Grey Iron Fdry. Div.
Central Foundry Div.
McKinnon Industries, Ltd.
Pontiac Foundry Div.
Saginaw Malleable Div.

American Foundry Co.
Standard Foundry Co.
Ford Motor Co., Ltd.
Massey-Harris Co.
J. I. Case Co.
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BUILDERS OF COLEMAN AND SWARTWOUT OVENS

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COLEMAN
CORE AND MOLD OVENS

OVER 9000 SUCCESSFUL INSTALLATIONS

PROGRAM FOR OHIO CONFERENCE

To Cover New Developments

A COMPREHENSIVE program of technical papers keyed to the theme, "New Developments for the Operating Foundryman", is scheduled for the second annual Ohio Regional Foundry Conference to be held at Columbus O., Mar. 11-12. The conference is being sponsored by the five Ohio chapters of the American Foundrymen's Society in co-operation with Ohio State University and will be one of the features of that school's 75th anniversary celebration. Dr. Douglas C. Williams of the Department of Industrial Engineering is general chairman of the conference.

A general meeting devoted to the subject of casting design will open the conference Friday morning, Mar. 11. Four technical sessions will be conducted simultaneously that afternoon and Saturday morning, these being concerned with subjects relating to gray iron, steel, malleable iron and nonferrous metals, respectively. Friday's sessions will be held at Ohio State University, while a dinner that evening and Saturday's meetings are scheduled for the Deshler-Wallick Hotel.

Friday, March 11

Registration, Ohio State University ..... 9-10:30 a.m.

Opening Meeting ..... 10:30 a.m.
Chairman: Dr. Jesse Huckert, Ohio State University. Address, Dean C. E. MacQuigg, College of Engineering, Ohio State University. Welcome, Fred W. Fuller, chairman, Central Ohio Chapter, AFS. Addresses: "Design of Crankshafts and Center Frames for Diesel Engines," T. C. Kuivinen, Cooper-Bessemer Corp., Mt. Vernon, O.; "Sound Castings Can Be Engineered," W. T. Bean Jr., Continental Aviation & Engineering Corp., Detroit.

Luncheon ..... 1:00 p.m.
Toastmaster: Dr. Douglas C. Williams, Department of Industrial Engineering, Ohio State University. Speakers: Dr. Howard A. Bevis, president, Ohio State University; "Foundry Curriculum at Ohio State," Dr. Paul N. Lehoczky, chairman, Department of Industrial Engineering.

Gray Iron ..... 2:30 p.m.
Chairmen: E. H. King, Hill & Griffith Co., Cincinnati; K. F. Schmidt, United Engineering & Foundry Co., Canton, O. "Something New in Foundry Sand," by Harry W. Dietert, Harry W. Dietert Co., Detroit.

Steel ..... 2:30 p.m.
Chairman: Robert Jansen, Unitcast Corp., Toledo, O. "Good Housekeeping Pays Off," by Robert G. Scott, Commercial Steel Casting Co., Marion, O.

Malleable Iron ..... 2:30 p.m.
Chairman: John W. Clarke, General Electric Co., Erie, Pa. "Production Patterns for Malleable Foundries," by Vincent Sedlon, Master Pattern Co., Cleveland.

Nonferrous ..... 2:30 p.m.
Chairman: John G. Kura, Battelle Memorial Institute, Columbus, O. "Nickel and Nickel Silver Alloys," by L. E. Grubb, Bayonne Foundry, International Nickel Co., Bayonne, N. J.

Gray Iron ..... 4 p.m.
Chairmen: Herman K. Ewig, Cincinnati Milling Machine Co., Cincinnati; Lloyd W. Leeseberg, Superior Foundry Inc., Cleveland. "Recent Developments in Cupola Operation," by L. L. Clark, Buick Motor Div., General Motors Corp., Flint, Mich.

Steel ..... 4 p.m.
Chairman: Ray Fischer Jr., Bonney-Floyd Co., Columbus, O. "Metal Penetration," by A. J. Kiesler, General Electric Co., Schenectady, N. Y.

Malleable Iron ..... 4 p.m.
Chairman; J. R. Kanengeiser, Ohio Malleable Iron Co., Columbus, O. "Metallurgical Headaches of Scrap Iron in the Malleable Industry," by Milton Tilley, National Malleable & Steel Castings Co., Cleveland.

Nonferrous ..... 4 p.m.
Chairman: H. T. Schwab, Bunting Brass & Bronze Co., Toledo, O. "Another Approach to New Developments in Making Nonferrous Castings," by William Ball, R. Lavin & Son Co., Chicago.

Dinner—Deshler-Wallick Hotel ..... 7 p.m.
Toastmaster: N. J. Dunbeck, Eastern Clay Products Inc., Jackson, O. Speaker: Dr. Eleroy L. Stromberg, Department of Psychology, Western Reserve University, Cleveland. "New Approach to Selection of Foundry Personnel."

Saturday, March 12

(All sessions in the Deshler-Wallick Hotel)

Registration ..... 9 a.m.

Gray Iron ..... 9:30 a.m.
Chairmen: A. W. Schneble, Advance Foundry Co., Dayton, O.; C. H. Lorig, Battelle Memorial Institute, Columbus, O. "Methods of Production and Properties of Nodular Gray Iron," by C. O. Burgess, Gray Iron Founders' Society, Cleveland.

Steel ..... 9:30 a.m.
Chairman, W. H. Heimberger, Buckeye Steel Castings Co., Columbus, O. "Oxygen Injection Treatment of Steel Melts," by J. B. Davenport.

Malleable Iron ..... 9:30 a.m.
Chairman, Steve Kelley, Eberhard Mfg. Co., Cleveland. "Gating and Risering of Malleable Castings," by Harold Sieggreen, Central Foundry Div., General Motors Corp., Saginaw, Mich.

Nonferrous ..... 9:30 a.m.
Chairmen: L. W. Eastwood, Battelle Memorial Institute, Columbus, O.; W. S. Klayer, Aluminum Industries Inc., Cincinnati. "New Developments in Determining the Fluidity of Aluminum Castings," by Walter E. Sicha, Aluminum Co. of America, Cleveland.

Gray Iron ..... 11 a.m.
Chairmen: J. D. Judge, Hamilton Foundry & Machine Co., Hamilton, O.; R. C. VanHelen, Unitcast Corp., Toledo, O. "The Modern Gray Iron Foundry," by E. E. Ballard, Lester B. Knight & Associates, Chicago.

Steel ..... 11 a.m.
Chairman: C. E. Sims, Battelle Memorial Institute, Columbus, O. "X-Ray and Its Practical Application for the Steel Foundryman," by R. M. Landis.

Malleable Iron ..... 11 a.m.
Chairman: John Urban, Fanner Mfg. Co., Cleveland. "Finish Control," by John Zeindler, Albion Malleable Iron Co., Albion, Mich.

Nonferrous ..... 11 a.m.
Chairman: R. W. Parsons, Ohio Brass Co., Mansfield, O. "New Developments in Nonferrous Melting Equipment and Practice," round-table discussion. Speakers: Fred Glass, Deming Co., Salem, O.; Jack Ziessman, Grabler Mfg. Corp., Cleveland; W. R. Huffman, H. B. Salter Mfg. Co., Marysville, O.; W. J. Doelke, National Cash Register Co., Dayton, O.

Luncheon ..... 1 p.m.
Toastmaster: Dan E. Krause, Gray Iron Research Institute, Columbus, O. Chairman: George K. Dreher, Foundry Educational Foundation, Cleveland.

Book Review

Metal Spraying and Sprayed Metal, rewritten by W. E. Ballard, cloth, 362 pages, 6¼ x 9 in., published by Charles Griffin & Co., London, and distributed in the United States by American Metallizing Contractors Association, St. Louis.

This textbook, the third edition, is intended to be a guide to the technician and the scientist as well as a help to the operators of the metal spraying process. The author includes discussion of compressed gases and subsidiary apparatus as necessary in the appreciation of certain fundamentals necessary for the smooth working of the metal spraying process.

Chapters deal with such subjects as the modern molten metal process, the modern powder process and wire spraying; preparation of surfaces for metal spraying, working the process, the nature of sprayed metal, properties of metal sprayed surfaces and applications of the process. Sections also are devoted to special processes, installation of plant and apparatus, and a comparison of metal spraying with other methods of protection and deposition.

Motion, Time Study Book Is Revised

Third edition of *Motion and Time Study* by Ralph M. Barnes, professor of industrial engineering at University of Iowa, has been published by John Wiley & Sons, New York.

Findings of a recent survey conducted among 80 factories throughout the country are incorporated in the book along with a complete revision of the material in the previous edition. Five new chapters on process analysis, gang process charts, activity charts, and man and machine charts have been added. Two appendixes telling how to set up a work methods training program also are new in this edition.

Book Review

Transactions of the American Society for Metals, 1948, cloth, 1171 pages, 6 x 9 inches, published by the American Society for Metals, Cleveland.

Containing 41 papers and discussions presented at the society's 29th annual meeting held in Chicago in 1947, this volume contains a summary of the proceedings of that meeting and the Edward DeMille Campbell Memorial lecture on "Ductility of Steels for Welded Structures" by A. B. Kinsel. Papers cover a wide range of topics dealing with the metal field, and 11 relate to castings. Those discuss magnesium alloys, white cast iron, heat and corrosion resisting steels, carbon and alloy steels, induction hardening of cast iron, etc.

Purification by IMMERSION as PRACTICED IN INDIA

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The highly satisfactory results achieved with this scientifically balanced flux are strongly substantiated in their laboratory report.

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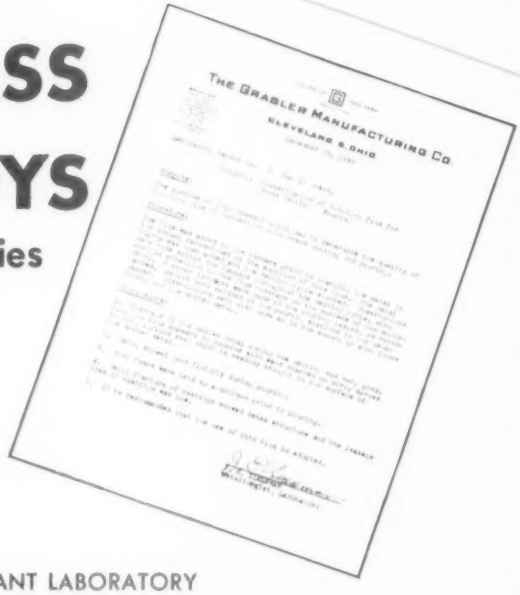

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THE PURO-SEAL COMPANY

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INDUSTRY *Briefs*

CONSOLIDATED Foundry & Machine Co., P. O. Box 342, New Castle, Pa., formerly Precision Foundry Inc., has been converted to the manufacture of soil pipe from its former production of 1000 tons a month of gray iron castings. Present soil pipe production is 800 tons monthly.

* * *

Cutler-Hammer Inc., Milwaukee, electrical manufacturers, has moved its Indianapolis sales office to 644 East Maple Rd., Indianapolis 5. F. W. Gilchrist manages the office as a branch of the company's Chicago district office.

* * *

Apparatus Department of General Electric Co., Schenectady, N. Y. has established a separate sales district for Michigan, with headquarters in Detroit. The Michigan district will include present local sales offices in Detroit, Lansing, Jackson, Grand Rapids, and Saginaw. A. R. Hines has been named manager and V. J. Snyder and C. M. Dunn assistant managers of the office.

* * *

Chain Belt Co., Milwaukee, has established a new warehouse at 878 Ashby St. N. W., Atlanta. The Atlanta district office also will be located at this address under the direction of J. S. Moore, district manager. G. J. Schuelke, formerly of the Milwaukee office, is supervisor of the new warehouse.

* * *

Walsh Refractories Corp., 4070 North First St., St. Louis, has purchased property adjacent to its present office and plants. A modern, air-conditioned office building and additional warehousing facilities are being constructed on the site.

* * *

Cleveland Automatic Machine Co., Cincinnati, manufacturer of die casting machines, has moved its New York district office to 1060 Broad St., Industrial Bldg., Newark 2, N. J. The office is under the management of R. T. Carroll.

* * *

Half interest in the Broken Arrow Casting Co., Broken Arrow, Okla., has been purchased by George D. Reed, Dallas, Tex. Operations will continue as before, supplemented by Mr. Reed's 30 years' experience in foundry work.

* * *

American Optical Co., Southbridge, Mass., has acquired a 6-acre tract at Stamford, Conn., for construction of a research laboratory. Property includes a year-old building containing 13,000 sq ft of floor space. Research activities to be conducted in the Stamford laboratories will supplement research at company headquarters in Southbridge and at its scientific instrument division, in Buffalo.

* * *

Syntron Co., Homer City, Pa., has opened sales offices in Des Moines, Iowa, with Mark Chisholm as manager, and in Kansas City, Mo., with Ernest K. Hood, manager. R. K. Bentzien has been added to the Milwaukee sales office staff.

* * *

Wheelco Instruments Co., Chicago, has opened a district office at 2204 Fannin St., Houston 5, Tex., to service Texas, Louisiana and New Mexico. George Hatfield, formerly of the Chicago sales office, is in charge.

* * *

Continental Industrial Engineers Inc., 176 West Adams St., Chicago 3, engineer, designer and manufacturer, has appointed the R. W. Richards Co., Ridgewood, N. J., as its eastern representative.

* * *

Dravo Corp., Pittsburgh, has appointed Superior Coal, Coke & Fuel Oil Co., 919 Wells St., Fort Wayne, Ind., as distributor of the company's heaters in northeastern Indiana.

* * *

Dunrite Industries Inc., Ninth and Commercial Sts., Manitowoc, Wis., has changed its name to Manitowoc Grey Iron Foundries Inc. Management and ownership remain the same.

* * *

American Toy & Foundry Co., Hortonville, Wis., plans erection of a 20 x 120-ft addition to its foundry to be built of concrete blocks, three stories high.

* * *

Waukesha Foundry Co., Waukesha, Wis., has completed installation of a 3000-lb capacity electric arc furnace for use in its production of stainless steel castings.

* * *

Utility Electric Steel Foundry, 3334 E. Slauson Ave., Vernon, Calif., has changed its name to the Utility Steel Foundry and the address to 3320 E. Slauson Ave.

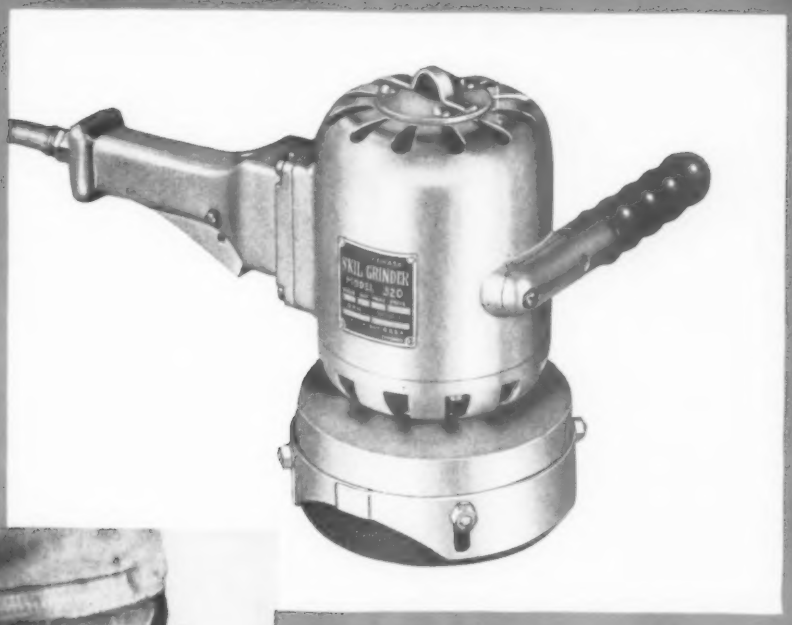
* * *

Gibbs Foundry Division, George W. Borg Corp., Galva, Ill., suffered fire damage estimated between $75,000 and $100,000 on Dec. 25.

* * *

Milwaukee Chaplet & Mfg. Co., 1025 South 40th St., Milwaukee, is completing a 40 x 100-ft warehouse on South 44th St., Milwaukee.

EXHIBIT: Federal Malleable Co., Milwaukee, showed the above exhibit at the recent national convention of American Vocational Association, Milwaukee Municipal Auditorium. The same exhibit was displayed at the national convention of the Society of Mechanical Engineers held at Milwaukee in June. Purpose of the exhibits was to inform vocational educators and engineers of the uses of malleable iron and its special qualities



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FOUNDRY STATISTICS

Index of Foundry Equipment Orders

Foundry Trades Only
(Net Orders Closed, New Equipment)

	1947	1948
Jan.	466.9	380.9
Feb.	472.5	367.3
Mar.	532.3	326.2
Apr.	445.9	412.0
May	525.9	388.5
June	658.9	376.8
July	426.1	456.3
Aug.	411.3	324.7
Sept.	393.1	273.5
Oct.	438.2	296.0
Nov.	286.1	284.4
Dec.	467.8	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Estimated Number of Foundry Production Workers

Type Foundry	Sept. 1948	Aug. 1948	Sept. 1947
Gray Iron	109,800	106,400	112,400
Malleable Iron	38,500	37,300	35,600
Steel	70,900	69,400	66,200

Source: Bureau of Labor Statistics. Estimates adjusted to Federal Security Agency data through 1945.

Castings Production

In Philadelphia Federal Reserve District
(November, 1948)

Type	Percentage Change From: Oct., 1948	Nov., 1947
Gray Iron	—13.5	+ 8.1
Malleable Iron	— 9.6	+33.3
Steel	—12.1	+16.5
Nonferrous	— 8.6	+50.0

Source: University of Pennsylvania.

Average Earnings and Hours of Foundry Workers

Type Foundry	Average Weekly Earnings Sept. 1948	Aug. 1948	July 1948	Average Weekly Hours Sept. 1948	Aug. 1948	July 1948
Gray Iron	$59.63	$58.08	$56.66	40.2	40.4	39.8
Malleable Iron	59.28	59.44	57.37	39.3	40.2	40.0
Steel	60.93	61.79	58.71	39.8	41.4	40.0

Source: Bureau of Labor Statistics.

—SHIPMENTS OF CASTINGS—

(Reported by Bureau of the Census)

Gray Iron Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1946			
TOTAL	10,269,657	6,102,246	.....
1947			
June	1,038,356	596,874	2,710,854
July	912,939	519,137	2,675,138
Aug.	951,859	550,961	2,631,273
Sept.	1,025,089	590,702	2,679,858
Oct.	1,154,192	654,426	2,668,781
Nov.	1,020,239	561,660	2,687,244
Dec.	1,066,211	587,933	2,782,236
TOTAL	12,540,960	7,181,299	.....
1948			
Jan.	1,064,335	584,238	2,802,685
Feb.	1,024,450	571,406	2,769,408
Mar.	1,169,085	659,821	2,726,415
Apr.	1,051,083	584,969	2,690,893
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831

* For sale only.

Steel Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1946			
TOTAL	1,432,049	1,043,358	.....
1947			
June	139,031	103,888	445,475
July	116,956	85,014	473,923
Aug.	120,405	88,719	478,649
Sept.	137,457	102,913	526,229
Oct.	148,358	111,288	497,344
Nov.	130,125	97,143	493,309
Dec.	148,124	110,970	489,364
TOTAL	1,625,055	1,203,504	.....
1948			
Jan.	141,068	106,282	491,745
Feb.	142,434	107,762	497,097
Mar.	162,891	125,550	508,822
Apr.	150,305	114,896	472,370
May	143,337	111,616	482,531
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	153,845	114,925	424,352

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1946			
TOTAL	752,028	452,355	.....
1947			
June	78,524	45,291	248,798
July	64,162	40,733	234,656
Aug.	62,404	38,165	229,735
Sept.	71,568	40,138	218,276
Oct.	83,979	47,673	210,695
Nov.	72,111	39,969	206,510
Dec.	77,757	44,042	202,408
TOTAL	895,054	513,228	.....
1948			
Jan.	77,744	45,808	205,759
Feb.	75,194	42,582	209,447
Mar.	86,767	50,017	203,351
Apr.	80,602	45,941	199,578
May	76,079	42,261	191,553
June	81,747	48,113	178,760
July	64,995	34,940	180,421
Aug.	73,273	41,088	176,824
Sept.	77,824	43,881	164,002
Oct.	81,761	44,305	158,351

* For sale only.

Aluminum Castings

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1946				
TOTAL	388,711	160,845	153,138	.....
1947				
June	32,986	11,775	13,105	102,758
July	30,197	10,095	11,739	101,370
Aug.	30,441	10,908	11,342	94,658
Sept.	35,877	12,228	14,146	94,637
Oct.	40,532	13,855	15,685	85,012
Nov.	34,683	11,428	13,558	83,975
Dec.	37,489	12,552	13,784	81,784
TOTAL	441,996	155,112	174,515	.....
1948				
Jan.	37,859	12,670	15,020	86,176
Feb.	37,963	12,177	15,055	88,032
Mar.	41,794	13,343	16,258	78,344
Apr.	38,269	12,407	14,563	78,499
May	33,868	11,854	12,351	75,219
June	35,822	12,296	13,239	72,930
July	28,944	9,851	10,504	70,321
Aug.	32,136	9,883	13,174	68,334
Sept.	35,877	11,822	13,353	66,773
Oct.	35,542	11,733	13,216	65,538

* For sale only.

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1946				
TOTAL	898,952	832,037	26,520	.....
1947†				
June	84,604	77,402	3,829	67,119
July	70,603	64,686	3,284	70,002
Aug.	75,060	68,271	4,021	68,659
Sept.	83,158	75,728	3,976	69,919
Oct.	92,119	83,592	4,763	67,280
Nov.	81,803	74,274	3,773	73,851
Dec.	87,215	79,495	4,393	74,814
TOTAL	1,051,742	960,732	51,139	.....
1948†				
Jan.	85,432	77,433	4,593	74,579
Feb.	87,169	79,329	4,509	71,143
Mar.	96,344	87,249	5,261	70,544
Apr.	89,035	80,426	4,705	70,726
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571

* For sale only.

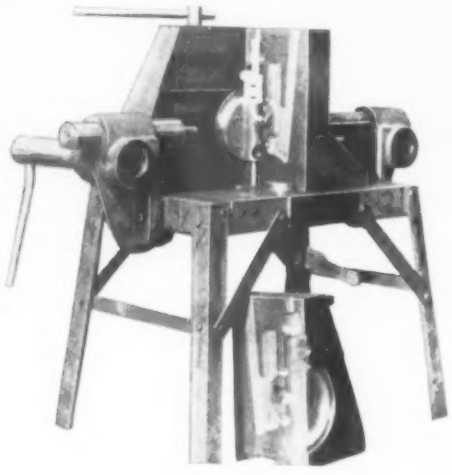
† 1947 and 1948 figures include copper and copper-base alloy castings.

Magnesium Castings

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1946				
TOTAL	8,472	7,149	532	....
1947				
June	613	476	93	3,183
July	492	372	67	2,772
Aug.	523	382	83	3,267
Sept.	518	421	56	2,747
Oct.	616	557	21	2,659
Nov.	602	540	31	2,808
Dec.	669	586	39	2,730
TOTAL	7,693	6,404	729	....
1948				
Jan.	659	592	...	2,701
Feb.	655	566	...	2,866
Mar.	704	645	...	2,741
Apr.	673	588	...	2,640
May	622	540	38	2,673
June	709	666	4	2,712
July	554	...	...	2,684
Aug.	703	...	...	2,834
Sept.	745	...	...	3,206
Oct.	708	...	...	3,070

* For sale only.



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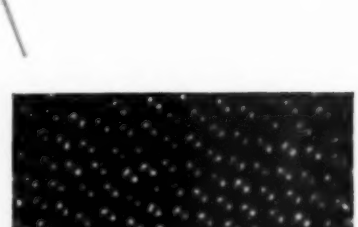

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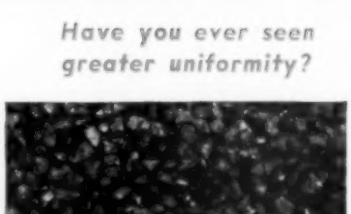

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio

Howell Works—Howell, Michigan

PRODUCING SMALL, INTRICATE CASTINGS

(*Continued from page* 83)

When production runs are to be small, the company makes a machined mold in which the wax pattern is cast during the production process. The mold is machined out of steel, bronze, aluminum or combinations of these metals. This mold, then, is used in production. When large production runs are anticipated, a machined model of the final part is made. This model serves as a master pattern from which pressed molds are made with low melting point alloys, such as the zinc base alloys or tin-bismuth alloys, cast in a hydraulic press at pressures of 50 to 60 tons per square inch. These pressed molds are capable of producing around 50,000 expendable wax patterns before being replaced. The cost of reproducing them from the master model is one-fifth to one-quarter the cost of making a machined mold. Consequently, they represent an economy on volume jobs.

Machines are simple

Machines for injecting wax into the molds are simple, hand-pressure machines with built-in electrical heating elements for keeping the injection wax at a constant preset temperature. Pressures developed vary from 150 to 200 psi and temperature of the wax is maintained at 165 to 210° F, both of these values depending upon the design of the casting. Because this company uses only one type of wax for all its patterns, it obtains greater or lesser wax fluidity by increasing or decreasing the temperature at which the wax is injected.

Most pattern waxes are composed of about 50 per cent specially prepared petroleum waxes, which usually are of the paraffin family. A number of manufacturers process the waxes especially for the precision investment casting industry. They range in properties from soft and highly fluid waxes for thin casting sections and intricate contours, to harder waxes which are less fluid and are intended for thicker sections. Waxes of different properties usually are colored with dry pigment dyes so that when used in the same plant they may be kept separated. The waxes shrink upon solidification, this shrinkage averaging 1 to 1½ per cent. It is a desirable property because it facilitates removal of the pattern from the mold; however, such shrinkage must be taken into consideration when planning the master

(*Continued on page* 174)

Portrait of a $13,000 profit

There's a story behind this x-ray picture of a gear blank.

A Michigan foundry got a six-figure order, turned out the first 50,000 with a reject rate of 14% — not high as castings go. Management then installed a General Electric Industrial X-Ray unit, began a series of studies.

Industrial x-ray revealed the cause of web shrinkage — and *indicated the remedy*. A change in gating, as the x-ray suggested, on the next 75,000 pieces pulled the number of rejects down to 1.2%.

On this casting, and one like it, the foundry saved $13,000—and added to prestige by delivering to customers castings they could count on.

General Electric Industrial X-Ray is today one of management's surest instruments for cutting costs. It is a developmental tool — showing profitways to manufacturers of automobiles, shoes, candy, airplanes, many more. It often pays for itself on the first job. For further detail, write to General Electric X-Ray Corporation, Dept. B-37, Milwaukee 14, Wisc.

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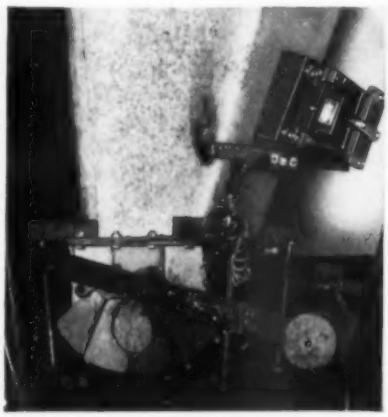

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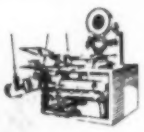
Variable control of material flow.

No motors, belts, idlers, bearings, etc. to maintain.

Capacities from pounds to hundreds of tons per hour.

"Weigh-Flow"

GRAVIMETRIC FEEDERS



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Write for literature—or request a representative.

SYNTRON CO.

540 Lexington **Homer City, Pa.**

(Continued from page 172)

model or the mold.

Various mold lubricants also are used to facilitate removal of patterns. They vary in composition, and a number of them are marketed under various trade names. A common type consists of a mixture of one part petroleum-base oil to six parts alcohol. Others are mixtures of castor oil and alcohol or soap and water. Most lubricants may be sprayed or brushed on the mold and the excess usually is blown off with a jet of air.

Fig. 2 provides a view of the wax injection machines used by this company. They are bucket-shaped containers of about three quarts capacity with an injection nozzle and a hand pump protruding through the open top. As shown by the operator on the right, the mold is held on top of the injection nozzle and the pump handle pushed down to inject the wax. Although temperature is controlled automatically, there is no indication of the amount of pressure being applied. This is a matter of "feel." When an experienced operator is given a new mold on which to work, she will make about eight or ten wax patterns before acquiring the correct "feel" for that particular job.

Wax Solidifies Rapidly

Time required for solidification of the wax in the mold is only a few seconds. Halves of the mold are held together with wing nuts or wing bolts to provide quick separation for removal of the pattern. The patterns are placed on trays which, when filled, are moved to another table in the same room where the patterns are cleaned up if necessary. The cleaning operation consists of removing any fins or adhering pieces of wax from the pattern with a small, sharp knife. At the same table, the patterns are equipped with wax runners and arranged on wax sprues.

Wax used for runners and sprues is that which has been reclaimed from the ovens where the pattern is melted out of the mold. No salvaged wax is reused for making patterns. The sprues are fastened with molten wax to a circular rubber base which is flat on the bottom and has a lip extending upward around the circumference. In the center of the top of the base is a small well into which the sprue is sealed with molten wax. The sprue extends upward about 5 or 6 inches and the patterns are attached with wax by their runners to this sprue. A small, electrically heated iron is used to "weld" the pieces together. Shop jargon for such a cluster of castings is a "Christ-

mas tree" or just plain "tree." These operations are shown in Fig. 4.

The assembled trees are placed on trays and carried into the next room where stainless steel flasks are placed over the trees and fitted inside the lip around the circumference of the flexible rubber base. As is shown in Fig. 5, the rubber bases are of different diameters. Two sizes are used to accommodate different size flasks.

Investment material which has been mixed with water to the consistency of "concrete soup" is poured into the flask and when hardened forms the mold. A number of supply houses furnish investment materials, which come in powder form and are mixed with water, generally, to the consistency desired. They consist primarily of refractories, vehicles and binders, and have varying degrees of fineness and different properties.

Employ Various Materials

A number of types of investment materials and varying investment practices are used at Precision Metalsmiths. When making nonferrous castings a "one-coat" system is used. That is, one type of investment material is poured into the flask and around the pattern. For ferrous castings a "two-coat" system is used. The wax pattern is dipped into an investment material which is very fine and has good shock resistance to high temperatures. It provides a smooth surface for the casting and also avoids cracking of the mold and fusion of metal with the mold. While the dip coating is still wet, fine grain sand is sprinkled over the pattern to provide a rough surface which helps adherence of the balance of the investment material. No dip coat is used for the molds into which nonferrous metal is to be cast. Results seem to be satisfactory with this method. Elimination of the dip coating operations saves time and simplifies the procedure. Most investment foundries aim at a one-coat system satisfactory for all work.

The investment material is mixed in the ratio of 2 lb of water as it comes from the tap to 10 lb of investment powder. This mixture of approximately 3 qt is weighed in a metal mixing bowl and the bowl placed under an ordinary kitchen type electric mixer for thorough blending.

To remove bubbles from the mixture, the bowl is placed under a bell jar as shown in Fig. 6 and the air exhausted at a vacuum of approximately 27 inches of mercury. This causes the mixture in the bowl to "boil" because of the surge of air

(*Continued on page* 178)

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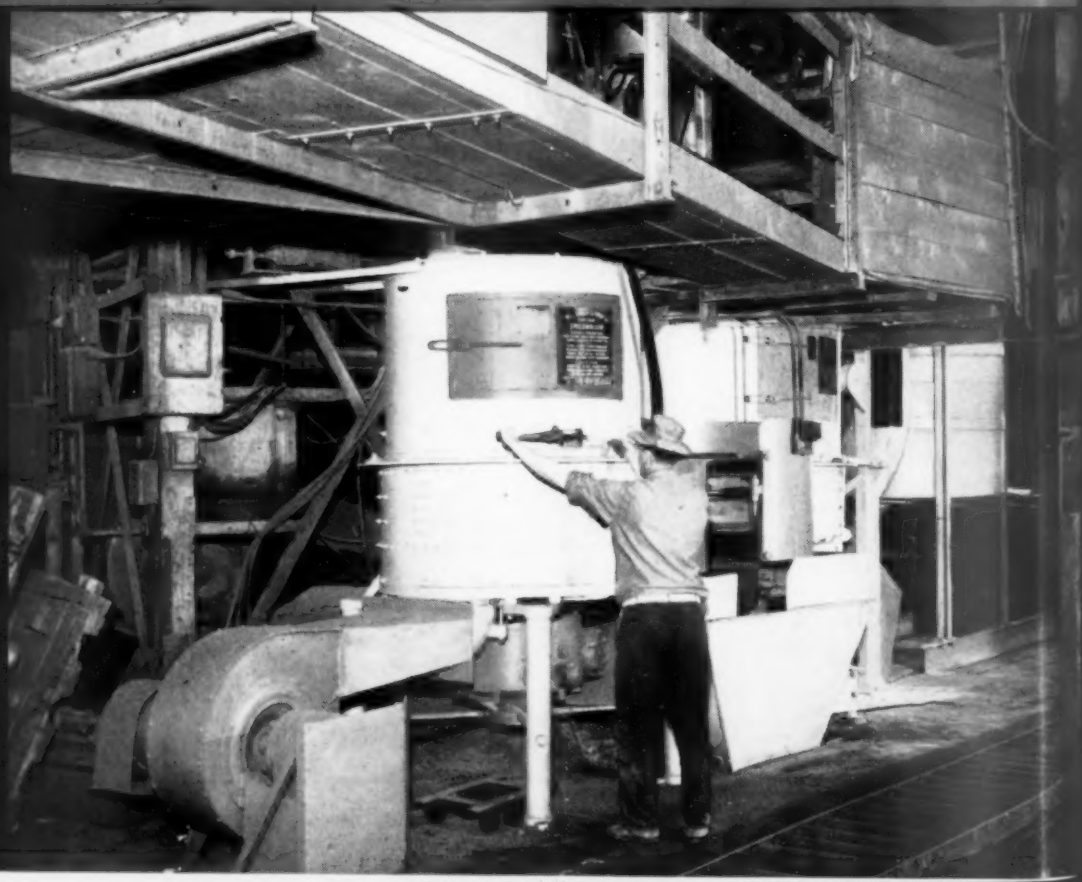
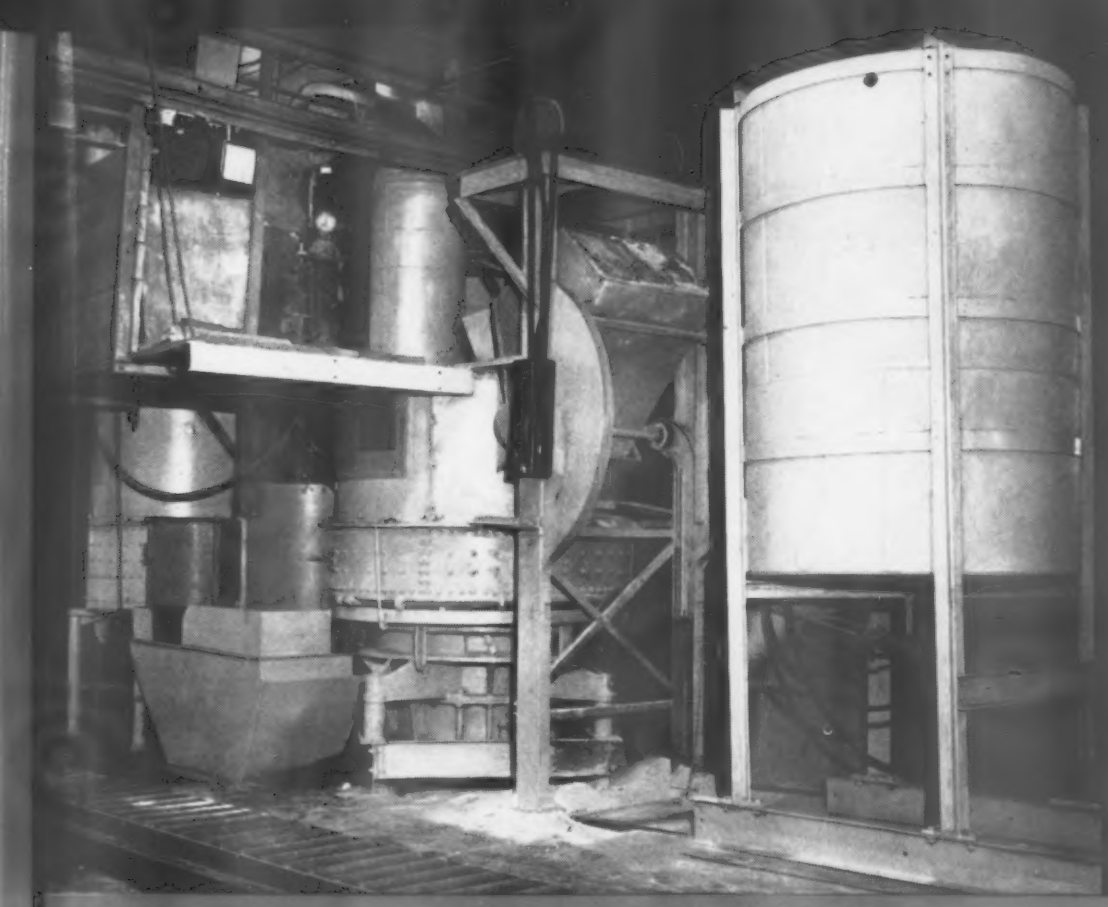


FIRST A MODEL 50

Dodge Steel's Model 50 Speedmullor mulls and cools simultaneously 7½ cu. ft. batches in 1½ minute cycles. Speedmullor mulling is by far the fastest method—yet sand is thoroughly and uniformly mulled. Speedmullor cooling —forcing air through the sand, is the fastest and only really thorough cooling method.



THEN A MODEL 70

Model 70 Speedmullor (15 cu. ft. batch capacity) also mulls and cools in 1½ minute cycles. Like Dodge Steel's Model 50, it is also completely automatic for loading, fines removal, water and bond additions, mulling, cooling and discharging. Speedmullors are the only fast, thorough mulling method and the only thorough cooling method. Let B&P prove that statement!

. . . . . to meet their increased capacity requirements for thoroughly mulled and thoroughly cooled sand

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Why? Because it alone could give them the needed production and produce a thoroughly mulled and cooled sand. Yes, *thorough* mulling and cooling in 1½ minutes per batch. Later, production requirements rose still higher and Dodge Steel chose Speedmullor *again*. Now, the Speedmullors easily meet peak sand requirements . . . they have a better sand and they have complete control.

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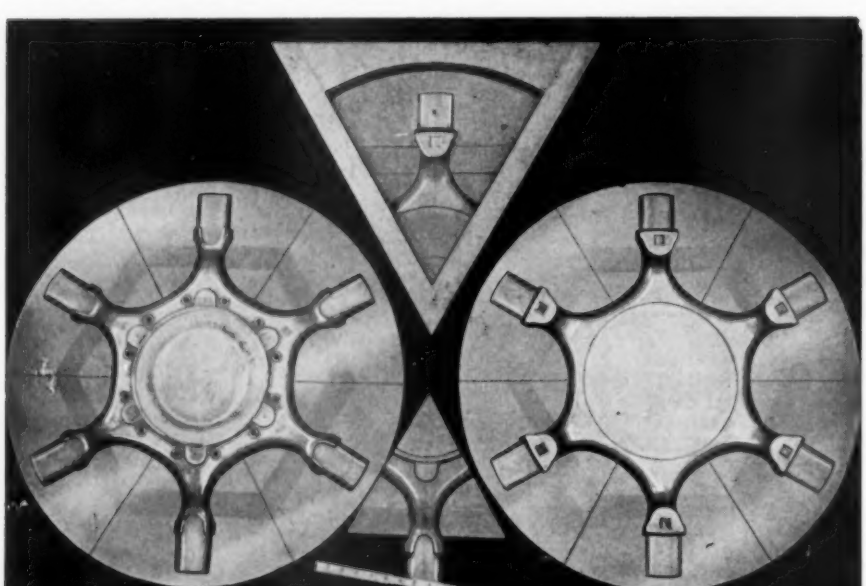

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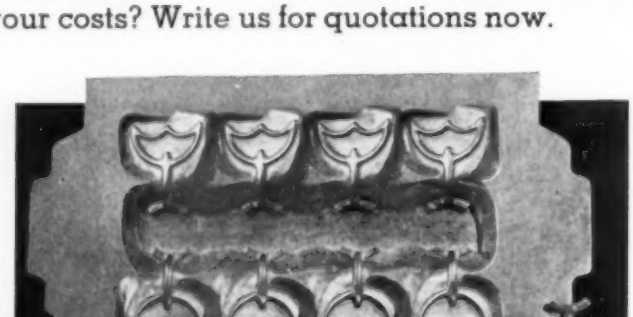

Matchplate made from master pattern

PLASTER PROCESS CASTINGS COMPANY
6922 Carnegie Avenue Cleveland 3, Ohio
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Pressure-Cast MATCHPLATES
COPE and DRAG PLATES

(*Continued from page* 175)

bubbles to the surface. The operator releases the vacuum occasionally by movement of a handle to prevent the mixture from "boiling" over and running into the air outlet. The section of the work counter on which the bell jar rests is mounted on springs and the operator taps this table gently to help dislodge bubbles which might cling to the sides of the bowl.

The mixture then is poured into the waiting flasks, the filled flasks placed under the bell jar, and the vacuum process repeated to remove bubbles that may have got into the mixture during pouring. A rubber sleeve is placed over the top of the flask before the investment material is poured to provide expanding space for the mixture during the vacuuming process. After the filled flasks are vacuumed the rubber sleeves are pulled off and the flasks allowed to sit on a shelf at room temperature until the investment material has hardened. This requires about 2 hr.

Melt the Wax

The rubber bottom plate is then removed from the flask and the mold is ready for melting out the wax pattern. This is done in an oven closely resembling a baker's pie baking oven and shown at left in Fig. 7. The temperature is kept between 100 and 200° F, depending upon the pattern design. When most of the wax has been melted out the flasks are moved to one of the ovens shown at the right in Fig. 7 where remaining wax is burned out at temperatures ranging from 1200 to 1800° F. All of these ovens are gas-fired and are vented for drawing off fumes.

All molds are poured with the assistance of vacuum at approximately 25 inches of mercury. The vacuum is developed by a pump working through a vacuum tank, both of which are contained in a metal box about 2 ft sq and resting on legs so that one side of the box forms a table top at convenient working height. The vacuum line from the tank is connected to an opening at one corner of the box top.

When the molds are to be poured, a couple sheets of moistened asbestos paper with holes cut in the center are placed over the vacuum line opening and a hot flask from the burn-out furnace is placed on the paper over the opening. The vacuum is turned on and the metal is poured immediately. Purpose of the vacuum is to increase the permeability of the mold. It is of some value, also, in assisting quick and complete feeding of mold cavities. The vacuum is held until the metal in the mold

solidifies, which is a matter of a few seconds.

Nonferrous metals are melted in a gas-fired crucible furnace which has a capacity of 14 to 45 lb, depending upon the metal being melted. The furnace is located immediately next to the vacuum box and a corner of it can be seen in Fig. 11 behind the operator.

The only ferrous metal cast by the company is steel and it is melted in a small crucible placed in an induction heating coil. Pouring temperatures vary somewhat. A steel fuel pump rotor for aircraft engine was poured, for instance, at 2600° F. Temperatures depend upon the mold that is being poured. Aluminum, however, is poured at 1250° F in all cases.

Clean the Castings

When the castings have cooled they are carried to the knockout room (Fig. 8) where they are taken out of the flasks and the investment material removed. The work is done at a grilled table where the heavier particles of dry investment fall through the grill to a container and dust is exhausted through a hood over the table. Tools used for knockout consist of an ordinary hammer and pneumatically driven vibrator. A small combination tumbling mill and sand blast machine is used to remove hardened investment material that does not come off the casting with the use of the vibrator.

The knockout room also is equipped with shears which are used to cut some of the smaller castings from the sprues. A cut-off wheel also is available for removing some of the larger castings, and a bench type grinder is used for smoothing the point of attachment of runners to the castings.

A view of the finishing room is shown in Fig. 9. Here, small fins and burrs are removed from the castings with portable electric grinders equipped with exceedingly small drills which resemble those used by dentists. The customary small grinding wheels and burring wheels also are used.

Inspection of castings is mainly visual, although castings are selected at random from production runs and checked dimensionally for conformation to tolerances. In Fig. 10 one of the engineers is shown checking a die against the blueprint. He is rubbing off a few rough burrs with the aid of a small stone. This is a die for an aircraft engine fuel pump rotor, and a pre-production wax pattern produced in the die is shown in the foreground.

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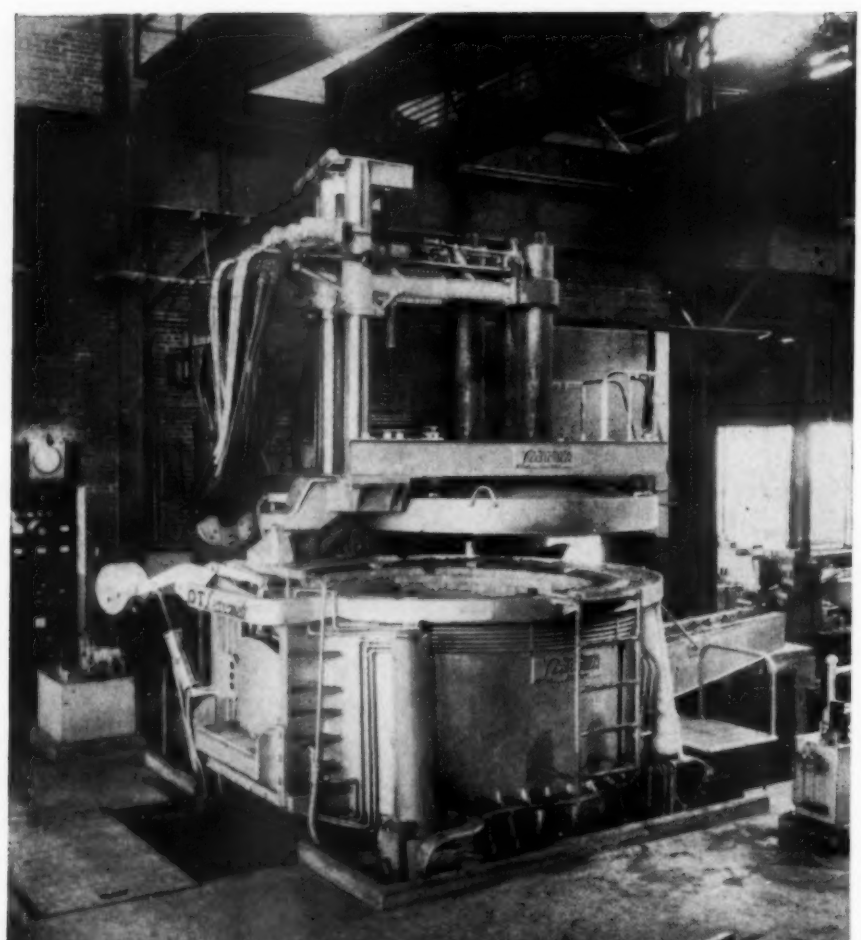

A size OT Pittsburgh Lectromelt Furnace shown with the roof in raised position and swung aside for charging. This size Lectromelt has an hourly rating of six tons and normally pours 12 to 15 tons per heat. The Lectromelt OT is particularly popular for use in making billet size ingots and its output capacity is approximately that of a 100 ton open hearth furnace operated continuously on batch cold melt pig and scrap basic or acid working. Note particularly the four point roof suspension, large diameter roof ring, hydraulic tilting mechanism and power-operated electrode clamps—all features which provide efficiency and durability in operation.

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DIE COATINGS FOR PERMANENT MOLD CASTING

(*Continued from page* 89)

as a coolant upon the various die components, (3) to serve as a lubricant for the moving die members, (4) to serve as an agent to prevent the castings from sticking in the die cavity, (5) to promote better surface appearance and sharper definition by enabling the molten casting alloy to lie quietly and close to the die cavity wall, (6) to decrease the occurrence of oxide build-up on the die face, (7) to prevent the casting alloy from entering into and sticking in any heat cracks which develop during the normal production run of the die, (8) to prevent the molten casting alloy from alloying or reacting with any of the constituents in the die material, (9) to nullify in part the undesirable forces of surface tension that exist in the molten casting alloy during the interval of die-fill, and (10) to prevent "blowing."

Die Coat Is Thermal Insulator

Of these functions that of No. 1 is the one of which advantage is taken most frequently by the permanent molder. Because the die coat (especially the permanent type) is capable of acting as a thermal insulator, it is employed to achieve several desirable effects of which the most interesting are: (1) That of prolonging die life by decreasing the initial thermal-fatigue-impact shock to the die cavity surface when the die fills with molten metal, (2) increasing the apparent fluidity of the molten metal by retarding its loss of heat and thus its premature solidification before the die cavity is completely filled, (3) improving the surface finish of the casting by preventing premature solidification of those layers of metal which are first to contact the die cavity walls, and (4) making it possible for the permanent molder to employ what he terms "directional solidification" of the metal in the die cavity.

Functions Nos. 1, 5, 7, 8, and 9 are generally considered to be best performed by the permanent type of die coating while the semi-permanent type of die coating is usually relied upon to perform functions 2, 3, 4, and 6. Actually there is evidence that certain of these functions can be performed to a certain degree by either type of die coating, viz., the function of acting as an insulating medium can be performed by either type

(*Continued on page* 184)

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THE CITIES SERVICE Industrial Heat Power will take a sample of gas direct from the combustion chamber of your furnace or oven and register immediately the exact percentage of oxygen or unconsumed fuel. This unique instrument will effect savings by improving combustion efficiency. It will

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NORBIDE Nozzles are recommended for foundry use because they will outwear conventional types of nozzles thousands of times.

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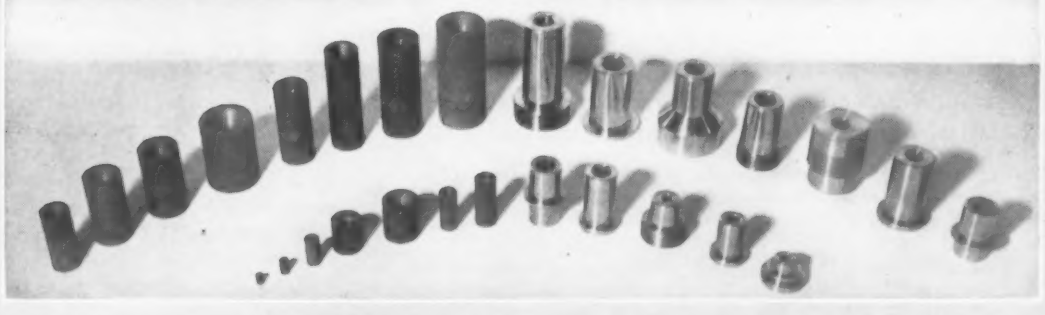
The great wear-resistance of NORBIDE Nozzles enables them to retain almost peak efficiency for a long time. The time lost by nozzle changes is saved. Production increases follow.



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HEATERS
WARM AIR
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Here are some of the DRAVO features important in foundry heating and ventilating:
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● When you establish comfortable working temperatures year round it's certain to show up in improved efficiency and higher morale among workers. In foundries or metal working shops, the reduction of smoke, fumes, and airborne dust by the introduction of clean, tempered fresh air is the first big step in establishing comfortable working conditions.

And you can accomplish these results quite readily by installing Dravo *Counterflo* Heaters. Characterized by their large air-handling capacity, and efficient method of air distribution, Dravo *Counterflo* Heaters are ideally suited for foundry ventilating during summer and winter seasons.

Dravo *Counterflo* Heaters can be shipped from stock so that you can take full advantage of the ventilating features during every season and have adequate heat available, instantly, when it's needed. Write or wire for descriptive Bulletin LD-523

Dravo also manufactures the *DRAVO CRANE CAB COOLER* for air conditioning hot-metal crane cabs.

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DRAVO

(*Continued from page* 180)

of die coating.

Permanent Die Coatings—The permanent type of die coating is employed primarily to insure a sound, acceptable casting possessing sharp surface definition, freedom from internal shrinkage porosity, homogeneous microstructure, and a smooth surface free of blow holes and cold-flow lines. In addition, the permanent type of die coating tends, as previously mentioned, to prevent the molten metal from entering into heat cracks in the die cavity surface. This function of sealing the heat cracks contributes to the fact that castings produced from properly coated, heat checked dies are relatively free of raised fin-like surface blemishes.

The reasons for trying to achieve directional solidification through an entire casting are that it promotes (1) a homogeneous microstructure consisting of uniform, or nearly uniform grain size, and the presence of the same phase or combination of phases throughout the cross section, as well as from section to section, and (2) a minimum of that variety of shrink porosity which is caused by one solidifying portion drawing molten metal excessively away from another section, thus causing the latter section to be porous.

Heavy Coat Delays Solidification

In the case of complex castings which have their main mass remote from the runner and risers, the application of a very heavy insulating die coating to the risers and runners insures delaying their solidification as long as possible so as to permit full metal shrinkage compensation.

A further function certain permanent die coatings are claimed to perform is that of serving as a venting medium, or layer, that literally absorbs the air trapped between the die cavity face and the molten metal. Ordinarily such trapped air would prevent close contact between the metal and die face, a condition which is necessary if sharp definition is to be obtained. One advocate of this venting procedure states that his die coating is extremely permeable and that it actually permits the absorption of entire trapped air bubbles!

It is required of certain permanent type die coatings employed in the production of copper-base alloy bearings and bushings that they prevent the occurrence of a defect known as "blowing." This defect is caused by the trapping of bubbles of gas between the solidifying casting surface and the die face. Such trapped gases originate largely from a reaction be-

(*Continued on page* 187)

You can't Beat this SPO Combination for making COPE and DRAG MOLDS

Here, we believe, is the *FASTEST COMBINATION* of cope and drag molding machines offered today!

One great factor in this exceptional speed is SPO's side roll-on and roll-off feature, which eliminates the handling of flasks by hand or crane.

SPO No. 200 Series for making either cope or drag molds.

Yes, sir! HERE'S A DRAG THAT STAYS AHEAD OF THE COPE!

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On again, off again, that's the idea—but fast! as SPO's side conveyors speed up handling and bring production costs tumbling down. Also, SPO's exclusive inverted jolt design, incorporated in both machines shown here, further boosts output and *insures sound, usable molds besides.* To get the full benefit, pair 'em up and watch 'em go! You have here, not only speed and accuracy, but endurance and long life that will make your investment look even better *at the end of 1949* than now. Always find out first what SPO has to offer!

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Photo of the Steinway by Victor Keppler

What Does a Piano Plate Need?

The purpose of a piano is to make music. To achieve that purpose successfully, it must be true to tone . . . it must hold pitch. The pull of the strings in a concert grand piano may be as great as 20 tons. In the plate which holds the strings, therefore, rigidity is essential.

Rigidity is one of the outstanding characteristics of Gray Iron. It also has a low coefficient of thermal expansion. That is why fine pianos are built with plates of Gray Iron. This quality of rigidity, combined with its many other attributes, makes gray iron the best material for thousands of products, from huge machine tools to delicate instrument parts.

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Gray Iron Characteristics Include:

Castability	Corrosion Resistance
RIGIDITY	Machinability
Low Notch Sensitivity	Vibration Absorption
Wear Resistance	Durability
Heat Resistance	Wide Strength Range

Make It Better With Gray Iron

GRAY IRON FOUNDERS' SOCIETY, INC.

NATIONAL CITY BANK BLDG., CLEVELAND 14, OHIO

(*Continued from page* 184)

tween the carbon of the cast iron die face (cast iron is most frequently used) and oxide present either on the die face as scale, or build-up, or the stream of incoming molten metal.

A low rate of pour and a low pouring temperature, a low die temperature, or the use of a heavily chilled die, i.e. one with a high thermal capacity, tend to decrease the occurrence of blowing, as does keeping the die face free of build-up. Blowing occurs most readily with leaded bronze, less with over-oxidized tin bronzes, still less, with gun metals, and never with bronzes containing aluminum.

While there are dozens of different formulas for the permanent type of die coating, each falls roughly into one of three classes:

1. Refractory material such as china clay, red talc, French chalk, borax, asbestos powder, mica, graphite, fire clay, rouge, bone ash, whiting, and sodium silicate mixed to a paste with water.

2. Combustible, or volatile organic materials, of an oily or resinous nature, often thickened with powdered graphite or colloidal graphite.

3. Aluminum oxide containing materials.

On the whole the refractory types of die coatings have the following drawbacks: (1) Insufficient adhesion to the face of the die, (2) difficulty in applying uniformly thick coatings, and (3) limited die temperature range for application—the coating tends to boil off if the die is too hot and it tends to run off without adhering when it is applied to a cold die face.

The combustible types of permanent die coatings tend to literally boil or burn off the die surface, leaving the die face unprotected.

Light oils when applied tend to run down the die face and accumulate in the bottom of the die cavity if merely brushed on. They work better if actually rubbed into the die surface, but this becomes too time consuming. They may however, be applied over a wide range of die temperature.

The heavier oily die coatings containing such constituents as beeswax, carnauba wax, tallow, vaseline, etc., can only be applied to a hot die.

Certain drying oils, such as linseed, may be applied uniformly to give a coating of the desired thickness while the die face is at any temperature within a wide range.

All of the die coatings containing water of crystallization, paraffin and turpentine cause tin sweat when em-

(*Continued on page* 190)

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They're More Economical . . .

That's right, Certified Samson Shot and Angular Grit are more economical because each grain is a solid homogeneous mass that wears away slowly, lasts longer for top-efficiency blast cleaning at lowest cost.

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OK St. Louis-

FOR the second time in its history The American Foundrymen's Society has chosen the great city of St. Louis as the 1949 convention city. These four days of technical sessions and important meetings will be of outstanding interest to all foundrymen. There is no question that there will be not only the meetings and discussions on foundry practice, but also on the important part cast metals are playing in this nation's every-day life and in the economic pattern of nations throughout the world.

The facilities of St. Louis to handle a meeting of this size and importance are well known and the activities of the St. Louis Chapter of the A. F. S. are already well under way to insure the success of these meetings and the accommodation of the many foundrymen who will be in attendance.

FOUR IMPORTANT DAYS

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MAY 2-3-4-5, 1949

53rd Annual

FOUNDRY CONVENTION AND CONGRESS

THE FOUNDRY

FOR MAY **FOR JUNE**

THE PRE-CONVENTION ISSUE

This issue of THE FOUNDRY will constitute a complete preview of these important days and will contain information of interest and importance to the entire foundry industry — a complete resume of the program of meetings and an outline of the congress which will again this year be held in conjunction with the convention. All this in addition to the regular features to be found in any issue of THE FOUNDRY.

THE POST-CONVENTION ISSUE

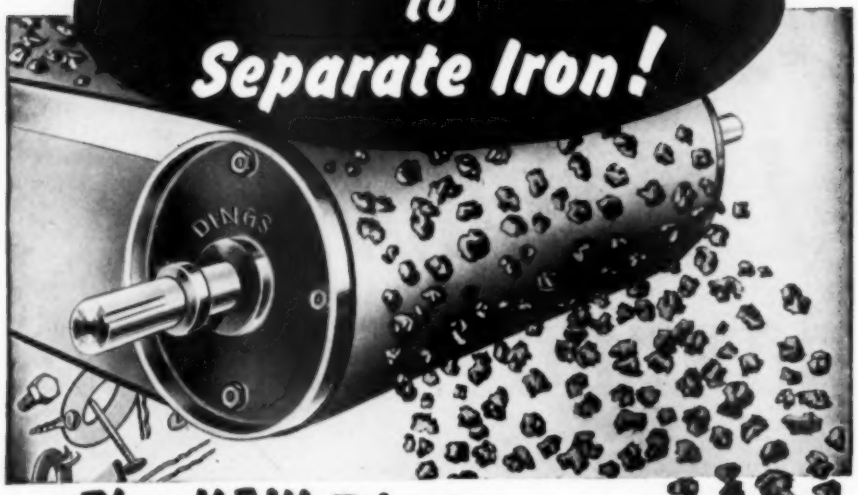
Of unusual importance this year will be the Post-Convention issue of THE FOUNDRY, reporting the many technical meetings with particular attention to the discussion of the part cast metals are playing in our industrial picture. The contents of the June Post-Convention of THE FOUNDRY will be valuable reading for all foundrymen whether they can attend the convention or not.

NOTE: To all manufacturers and suppliers who in any way contact, sell and serve the foundry industry, these two issues of THE FOUNDRY present an invaluable advertising opportunity geared to important advancement in foundry practice and at a time when the eyes of the entire industry are turned on the St. Louis convention.

• MAY 2-3-4-5 • 1949

PUBLICATION CLEVELAND 13, OHIO

THE MODERN WAY to Separate Iron!



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For: Separation of Ferrous and Non-Ferrous Scrap
Removal of Iron from Foundry Sand

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Backed by 50 years of magnetic separator manufacturing experience, this new pulley offers these plus features that assure you of maximum tramp iron removal:

- **Extra high strength grade of Alnico**
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Dings PERMA-PULLEYS are available in 53 sizes with shaft diameters to suit your requirements. *ALSO complete pulley type separators with PERMA-PULLEY, idler pulley, belt and drive in any size required.* SEND for new BULLETIN 260-A.

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Dings
"HIGH INTENSITY"

MAGNETIC PERMANENCE GUARANTEED *for life!*

(*Continued from page* 187)

ployed with permanent mold dies for the production of tin bronze castings for bearings or bushings.

Die coatings containing Al_2O_3, as such, or aluminum powder (the particles of which have a tough surface film of Al_2O_3) are of a water, oil, or resin base. When the carrier is water, a wetting agent is added. A good die coating of this type is one containing aluminum powder plus a resin carrier which can be applied over a wide range of die temperature and which gives a very uniform coating that is not easily broken or washed off by the impingement of the metal stream.

A few recommended permanent die coatings prepared by some foreign permanent molders who specialize in casting copper-base alloys follow:

Three parts powdered whiting, one part sodium silicate powder, and fifteen parts distilled water are thoroughly mixed and subsequently diluted to the desired consistency. (Whenever this die coating is not used in conjunction with a semi-permanent type of die coating, graphite must be added to facilitate removal of the casting from the die.)

Gives Other Coatings

Thirty gallons of water are brought to a boil, seven quarts of 40 per cent sodium silicate are stirred in until the two are thoroughly mixed, after which ten pounds of whiting are stirred in followed by one pound of either rouge or graphite. This is permitted to boil for a few more minutes while being stirred. It is then cooled to room temperature. Before using it is stirred vigorously.

One ounce of sodium silicate, one handful of whiting or china clay, and one quart of distilled water are thoroughly mixed while boiling for five minutes.

One part china clay and one part asbestos powder are added to a 10 per cent aqueous sodium silicate solution while boiling.

Two pounds of asbestos powder, eight ounces of dry sodium silicate, and two quarts of distilled water are stirred in together at the boiling temperature. One tablespoon of sodium silicate solution (water soluble content approximately 40 per cent and a 3.3 sodium silicate ratio), two tablespoonsful of powdered kaolin (of the colloidal type obtainable from Merck), and one pint of distilled water are mixed while slowly boiling the entire mass.

The major requirement for permanent die coatings is that they can be applied as thinly as possible so

(*Continued on page* 192)

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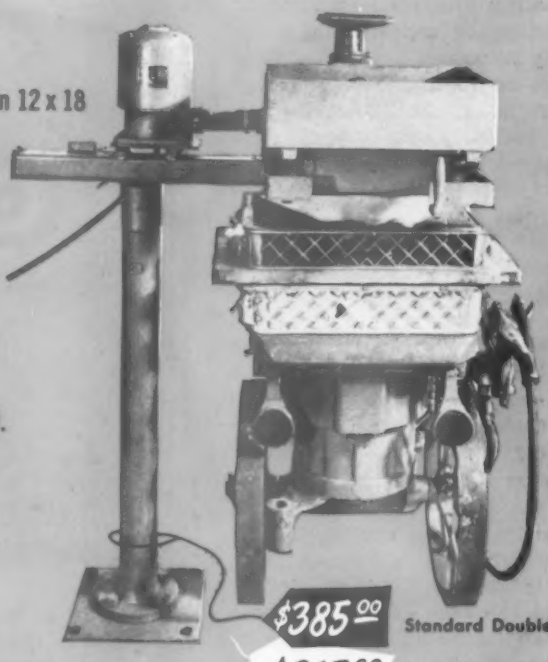

$385.00 Standard Double Channel

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Write for New Descriptive Folder

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PORT HURON, MICHIGAN

(*Continued from page* 190)

as to avoid surface inclusions in the castings and reduce the risk of gas absorption by the molten metal. In additon, they must be sufficiently tenacious to withstand accidental impingement of the incoming molten metal stream and thus in certain cases prevent blowing.

A host of satisfactory proprietary die coatings are widely employed by permanent molders who cast light metals, and certain of these are also applicable for permanent mold casting of copper-base alloys. Their principal advantages are (1) that they "come prepared" and do not have to be compounded in the foundry, (2) they are always of consistent nature —they give the same results from day to day, and (3) they are consistently being improved by research on the part of the makers.

Permanent die coatings can be applied by spraying, brushing or dipping. It is not uncommon for two of these methods to be used to coat a single die. For example, the entire die face may be sprayed and then certain areas given a little heavier coating with a brush.

Die Coating Is an Art

Die coating practice in permanent mold casting of copper-base alloys frequently is passed over too lightly —perhaps because, as already suggested, it is an art rather than a science. Skillful application of a die coat requires long practice, especially in spraying. However, difficulties arising from faulty application can be minimized by employing standard procedures for the application of the die coating—this fact cannot be overemphasized. Indeed, whenever a good formula and method of application are developed they should henceforth be followed. Of course, not all permanent coatings prove equally effective for a given die.

Before any permanent coating is applied, the die must be free of dirt, grease, oxide, or die coating left on from a previous day's run. A clean surface is best secured by dipping individual members of the die into a solution of sodium hydroxide; that is, provided the die components are small. When the die sections are large, they may be cleaned by brushing or scrubbing with a solvent such as carbon tetrachloride. This initial cleaning is followed by vapor blasting or sand blasting those surfaces of the die to be coated.

Once the die cavity members have been cleaned, they are heated very slowly in an oven until they reach a certain prescribed temperaure throughout their entire section. Slow uniform heating is absolutely essential. The precise temperature to which a die should be raised depends upon the coating to be applied. A temperature range of 200 to 800° F includes all those temperatures variously recommended for the different coatings.

In general, one should not heat the die hotter than that temperature at which the water present in the coating merely evaporates. When a die is too hot, the water in the applied coating tends to steam and spatter violently, carrying coating particles with it and leaving the die surface unprotected. Further, if the die is too hot when the coating is applied the resulting coating tends to be brittle and flake off permaturely. Nor should one have the die too cold, else the coating will blister later when the first molten metal enters the die cavity.

On coming out of the oven the heated die members are ready to receive the die coating which may, for example, be applied with a spray-gun. A light coating, sprayed all over those die members which are supposed to be treated, is either rubbed down by hand with steel wool, or polished with the aid of a fine, rotary steel brush. This procedure of alternately spraying and polishing is repeated until a tightly adhering coating reaches the proper thickness. The average thickness of a properly applied coating is in the order of 0.002-in. Lighter or heavier coatings may be applied in different sections of the die according to the degree of insulation required.

A skilled sprayer will complete a given die cavity with two or three separate coatings, and will finish all the gates, risers and runners, which call for a much heavier coating, by applying additional coating with a brush. Risers, gates and runners are given the heaviest coating in order to delay solidification in these areas until the remainder of the casting has solidified.

Remove Coating at Corners

At sharp corners within the die cavity, it is customary to remove the die coating altogether and so provide a chilling effect.

Elaborate die coating procedure is to be avoided as it is too difficult to duplicate from day to day. In fact, many permanent molders try to achieve the solidification they desire by using dies designed so that they automatically direct the solidification in the desired fashion.

As the die is operated throughout the day certain areas may require re-coating. If such re-coating is not done, the castings produced may be misruns.

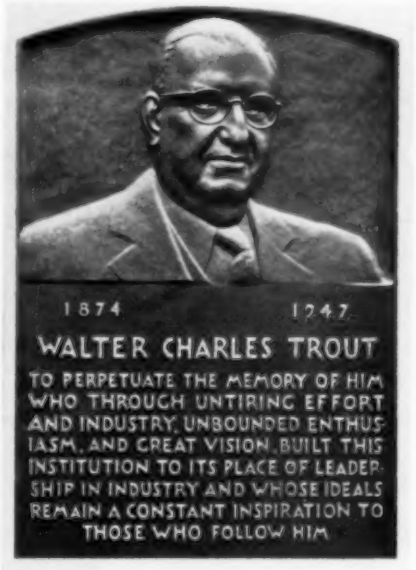
When the permanent coating needs renewal, the old coating must be removed by light vapor blasting or sand blasting. The die's temperature must next be raised again to that temperature at which the die coating is best applied—usually this temperature is above the normal operating temperature of the die. The die is then cooled to the operating temperature unless only sample castings are to be made.

Reheating the die to the proper temperature before applying a new coating is necessary because the coefficients of expansion of the die and the coating are quite different, and when the coating is applied to a cold die and the die is subsequently heat-

(*Continued on page* 194)

Plaque Dedicated to Late Foundry Head

Recent ceremonies on the grounds of the Lufkin Foundry & Machine Co., Lufkin, Tex., marked the unveiling of a bronze plaque, above, dedicated to the memory of the company's late president, Walter Charles Trout. The $2000 plaque, which was made possible through contributions by the company's 1200 employees, was unveiled by Jesse Belote, a long-time Lufkin employee. A. E. Cudlipp, vice president, made the dedicatory address, paying tribute to Mr. Trout's inspiring leadership among his associates. Lufkin Foundry's late president had been identified with the company from 1905 until his death in April, 1947.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TO PERPETUATE THE MEMORY OF HIM WHO THROUGH UNTIRING EFFORT AND INDUSTRY, UNBOUNDED ENTHUSIASM, AND GREAT VISION, BUILT THIS INSTITUTION TO ITS PLACE OF LEADERSHIP IN INDUSTRY AND WHOSE IDEALS REMAIN A CONSTANT INSPIRATION TO THOSE WHO FOLLOW HIM

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Electric industrial truck users have frequently expressed a preference for Exide Ironclad Batteries . . . the batteries that assure peak performance day after day.

Such overwhelming preference for the Exide-Ironclad Battery is based upon user experience. This unique battery has, during the past 35 years, proved itself to be a thoroughly dependable, safe and efficient power source for all makes and types of electric industrial trucks.

Different from all other batteries in construction as well as in performance, the Exide-Ironclad possesses ALL FOUR of the essential characteristics demanded of a battery for electric industrial truck service—(1) high power ability, (2) high efficiency, (3) great ruggedness, and (4) long life. These characteristics are due to the special construction of the Exide-Ironclad Battery, especially its rugged, tubular positive plate.

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It's because of this dependable service that such a large percentage of electric truck users prefer Exide-Ironclad Batteries—the nation's leading source of power for all makes and types of electric industrial trucks.

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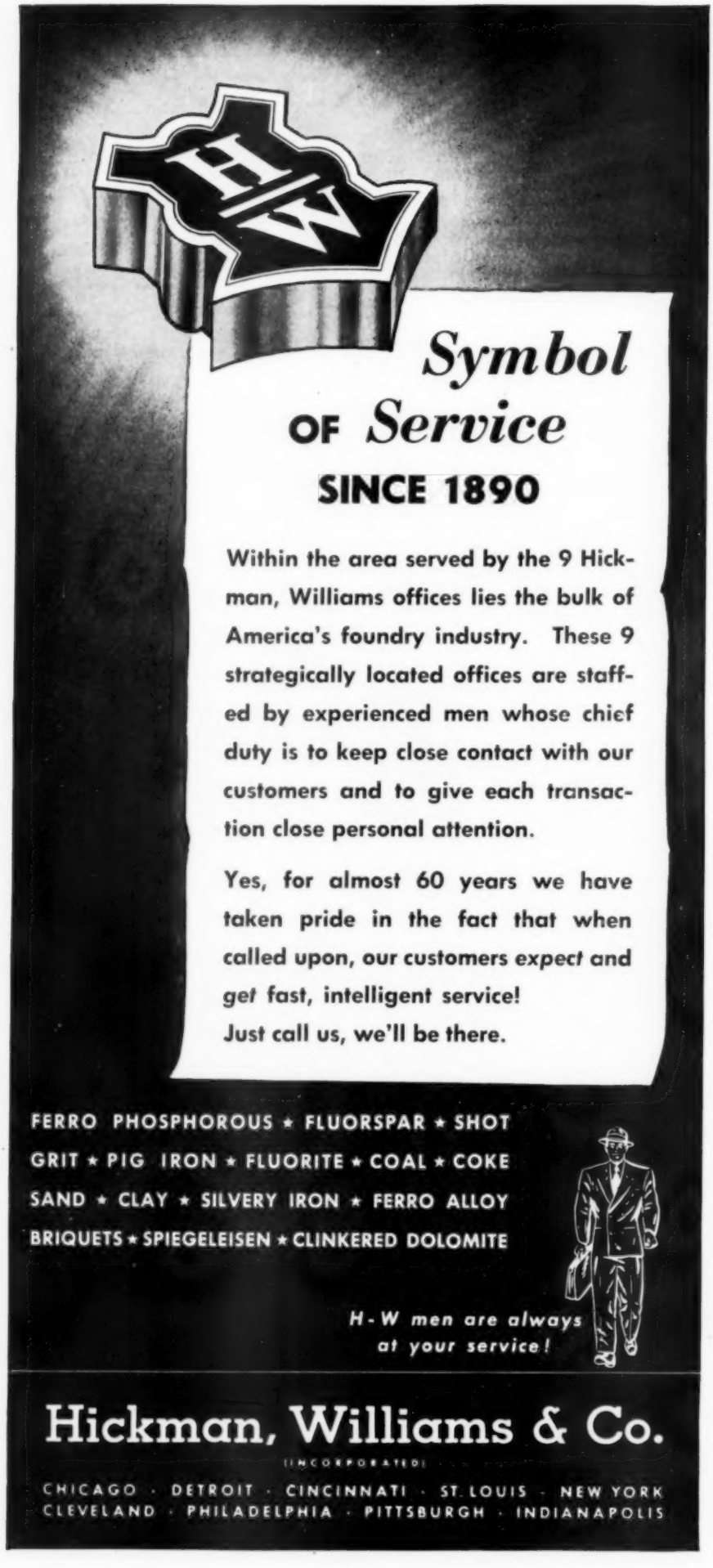
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(*Continued from page* 192)

ed by introduction of molten metal, the coating tends to flake off the die face.

Semi-permanent Die Coatings — The principal functions of the semi-permanent type of die coatings are: (1) To act as a cooling agent upon the die components, (2) to assist in the ejection of the casting from the die, (3) to inhibit the oxide build-up on the die face, (4) to act as a lubricant to facilitate withdrawal of cores from the casting, (5) to reduce oxidation of the die material, and (6) to enhance the running qualities of the casting metal.

Some permanent molders employ only a semi-permanent type of coating, not using a permanent type at all. Usually, however, both types of die coating are applied—one to supplement the other.

Semi-permanent types of die coatings generally contain one or more of the following constituents: Aluminum oxide, rouge, mica, and/or graphite (powdered or colloidal, the latter being preferred). These are suspended in an aqueous solution of sodium silicate or in a petroleum or silicone oil.

Many Die Coatings Listed

A few of the many types of die coatings currently employed are based on mixtures such as the following:

One part (by volume) of concentrated graphite of the powdered type plus ten parts of distilled water.

One part (by volume) of concentrated graphite powder plus ten parts of distilled water plus 6 per cent (by volume) of the heaviest density sodium silicate.

One part (by volume) of concentrated graphite powder plus ten parts of distilled water plus 6 per cent (by weight) of borax.

One pint of colloidal graphite plus twenty gallons of distilled water.

Light mineral oil plus graphite mixed to a thin consistency.

Tallow plus graphite. This combination is kept liquid by heating and is applied with a brush.

Beeswax plus graphite. Here again this mixture is maintained in the liquid state and applied with a brush.

Tyrol 118, a rather volatile oil, and .2-.1 per cent colloidal graphite.

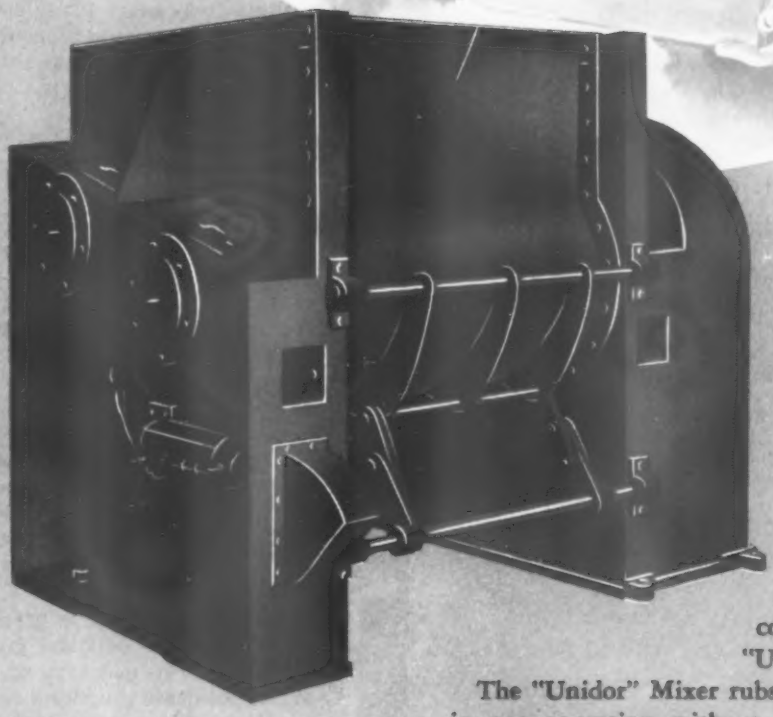
Aquadag (a suspension of colloidal graphite in water).

The majority of these compositions contain graphite. Graphite has a low coefficient of friction, it is resistant to high temperature oxidation, it is combustible at temperatures below 1112° F, it does not gum up in service, and it is a fair conductor of heat.

(*Continued on page* 196)

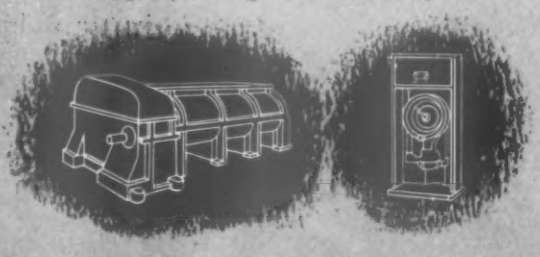
better core sand means fewer rejects

Baker Perkins Unidor core Sand mixer



Consistently better castings with reduced spoilage is the result of preparing core sand in a Baker Perkins "Unidor" Core Sand Mixer. The "Unidor" Mixer rubs, stirs and kneads sand all in one operation without need for aerating attachments. A thin layer of bond is distributed uniformly *around each grain of sand,* resulting in 100% benefit from bonds, binders, oils or other compounds used. Sand grains are not broken up, leaving it with a high degree of permeability. Extremely low maintenance required. Available in laboratory and batch-type sizes, up to 25 cu. ft. ' ' '

Other Baker Perkins foundry equipment, includes Liquid Meters which *automatically and accurately control the flow* of binder oil or water into the mixer, and Baker Perkins Continuous Sand Mullers which are available in 30, 40, 60 and 120-ton-per-hour capacities.



Baker Perkins SAGINAW, MICHIGAN • FOUNDRY EQUIPMENT SALES

BAKER PERKINS BUILDS EFFICIENT FOUNDRY EQUIPMENT

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS" CHROMIUM COPPER

By introducing chromium copper into copper—for the production of copper castings and drawn copper—the results are alloys of greater strength, hardness, electrical and thermal conductivity. These elements make them superior to pure copper in all applications which require conductivity, wear resistance and resistance to softening under continuous heat.

"Falls" Chromium Copper is furnished in shot form or bars to facilitate handling—and is supplied in two percentages and two forms.

"Falls" 5% Chromium Copper conforming to the following composition:

Chromium	4.0—6.0%
Total impurities	0.8%
Copper	Balance

"Falls" 10% Chromium Copper conforming to the following composition:

Chromium	8.0—11.0%
Total impurities	1.0%
Copper	Balance

WRITE TO US FOR DETAILED INFORMATION

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 17, NEW YORK

(*Continued from page* 194)

Semi-permanent types of die coatings can be applied by spraying, brushing or dipping. Dipping is most common in the United Kingdom and spraying is usually employed in the United States.

Semi-permanent die coatings are applied while the die is in operation. Frequency of application depends upon the nature of the coating, the function it is supposed to perform, the alloy being cast, and whether or not a permanent type of die coating is used in conjunction with it. Many permanent molders give the die a fresh coat of the semi-permanent type after each pour, others after every ten pours.

The first coat applied is always put on a hot die ready for the initial pour of a day's run. If the die has never been run before, the first few castings will most likely be rejects as it takes a couple of pours before the semi-permanent type of coating begins to take effect.

Prefer British Practice

The author prefers the British practice of dipping the dies into the semi-permanent type of coating, rather than spraying on the coating. The reason is that dipping not only coats the die surface, but it also cools the individual die members. There is a direct relation between the average temperature of the die members and their life span; the higher the die temperature, according to several sources, the shorter is the die life. This is borne out by the fact that the permanent molders who report the longest die life employ the dipping method of applying the coatings.

Powdered graphite is gradually being replaced by colloidal graphite in the semi-permanent type of coatings. When powdered graphite is employed, the individual particles tend to lie one on top of the other and to cover the die surface rather haphazardly. On the other hand, when colloidal graphite is used it tends to form a uniform layer of closely knit particles that give the die surface excellent coverage of uniform depth.

Copper-base alloys containing zinc tend to give off zinc oxide vapor, which adheres to the face of the die cavity and can cause an oxide build-up as thick as 0.003-in. in one day. This can be prevented by the use of a semi-permanent die coating applied by dipping. First, the presence of the coating acts as a buffer between the die face and the oxide vapor and reduces the tendency of the zinc oxide to adhere to the die surface.

(*Concluded on page* 198)

There's also an

"extra something"

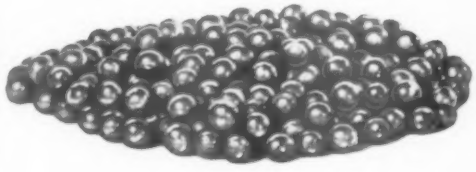
in ANNEALSHOT

Yes, just as certain personalities stand out from others, ANNEALSHOT has that "extra something" that other shot does not possess.

ANNEALSHOT is formed on special equipment to assure more uniform roundness, then annealed by an exclusive process that toughens and hardens it. That's why ANNEALSHOT gives a better finish, lasts longer and is easier on equipment.

If you haven't already changed over to ANNEALSHOT, as so many leading foundries have, send for that trial order . . . TODAY.

METAL BLAST INC.
872 E. 67th St. Cleveland 3, O.



ANNEALSHOT by Metal Blast

Trade Mark Reg. U. S. Pat. Off.

(*Concluded from page* 196)

Secondly, the chilling effect of the dip causes what zinc oxide does stick to flake off.

Still another function of the semi-permanent type of coating is to act as a lubricant for the die joints, sliding faces, loose collars, loose or movable cores, etc.

Defects Caused By Die Coatings— It would not be fitting to close this discussion without mentioning a few of the defects which can result from the improper application or choice of a die coating.

Most common defects are caused by the incorrect application of even the best die coating; solid particles of coating flake off and become entrapped in the surface of the casting. These particles of residual carbon or refractory material give rise to machining difficulties.

A second common defect is the formation of various forms of surface and/or subsurface porosity. This type of defect is produced by the partial combustion or volatilization of carbonaceous die coatings with the subsequent evolution of a considerable volume of oxides of carbon, hydrocarbons, water vapor, and possibly hydrogen, while water-bound refractory die coatings may lose their combined water as a vapor under the heating action of the molten casting alloy.

The major portion of such evolved gases are insoluble in molten copper-base alloys and tend to escape to the liquid surface; however, they may become trapped. When trapped at the solidifying surface, their presence gives rise to a defect similar to "blowing" in appearance or to the formation of spherical bubbles just below the casting's surface.

If the casting alloy has a high phosphorous content, it will, when molten, react with the water vapor, forming a metal oxide and hydrogen. The hydrogen, being in the atomic state, dissolves rapidly in the molten casting alloy; then when the metal solidifies, the hydrogen is evolved at the grain boundaries, forming fine cavities and fissures.

The evolution of gases by the solidifying metal has another undesirable effect, especially in those cases where the alloy being cast is of the high lead or tin bronze type such as used to make bearings or bushings; it causes tin sweat. This defect causes serious surface checking in bronze permanent moldings. The extreme hardness of the segregated compounds (δ, Cu_3P) leads to machining difficulties.

Acknowledgements — The author wishes to express his appreciation to the following for their gracious assistance in the preparation of this article and for furnishing the photographs.

1. Westinghouse Electric Corp.
2. Non-Ferrous Die Castings Co., Great Britain.
3. Ulrich's Metalstoberi, Denmark.
4. Scottish Precision Castings Ltd., Great Britain.
5. Fry's Die Casting Co., Great Britain.
6. Metropolitan Electric & Mfg. Co. Ltd., Great Britain.
7. And in particular to H. K. Barton, Great Britain.

CHRISTMAS AT HAMILTON: Employees of Hamilton Foundry & Machine Co., Hamilton, O., received over a quarter of a ton of silver dollars, food baskets and dressed fowl at the company party held just before Christmas. Top view shows Solomon Croom receiving his basket from President Peter E. Rentschler. At bottom, left to right, are John Nickel, foundry superintendent; Mr. Rentschler, and Donald McDaniel, vice president. Employees were presented up to 50 silver dollars each, the amount depending on their length of service with the company

Book Review

Elementary Physical Metallurgy, by Edward G. Mahin, cloth, 276 pages, 5½ x 8½ in., published by Chemical Publishing Co. Inc., Brooklyn, N. Y. Price $6.

Starting with the microscope and the preparation of metallographic specimens, this book deals with the fundamental properties of materials and their relationship to one another, methods of testing and the interpretation of test results. Special attention is given to fundamentals, and care has been taken not to encumber the book with abstruse conceptions.

The discussions of fundamental metallurgical facts and theories are developed in such fashion as to make the book valuable as a short course for mechanical, electrical, chemical and aeronautical engineers as well as an introductory text for majors in the metallurgy field.

Quality Control in the foundry a job for PYROLANCE!

Quick, accurate temperature readings of molten metal are reason enough why so many non-ferrous foundry operators depend on the Alnor Pyrolance! The protected thermocouple, with adjustable angle head, is mounted in the lance tip—takes temperatures below the surface, unaffected by dross or other conditions. And the rugged pyrometer movement gives accurate readings—quickly, of course. A well-balanced, easily handled instrument you'll like from the first time you try it.

Alnor PRECISION INSTRUMENTS FOR EVERY INDUSTRY

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Get a copy of this informative Pyrolance bulletin. Includes photos, complete descriptions and prices. Use this coupon.

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THE ADVENTURES OF *Bill*

By PAT DWYER

Drawings by RICHEY

ONE night recently while a howling half gale slashed rain against the windows, I spent half an hour with a pair of (a) adorable and (b) aggravating, wriggling, twisting grandsons, who bravely announce to one and all that they are four and half years old and are going to school next September. They are looking forward to this great event with the keenest pleasure and blissful anticipation. I shall be interested in learning what system the teacher has, or may develop, to keep them in one place more than a minute or two. I am afraid the teacher may be tempted to use a baseball bat, but if that happens I shall have to come out of my shell and gently suggest that it might be a good idea for him or her to have an earnest interview with the local mortician, also indicate preference in flowers. I won't lay violent hands on my cute little rascals and I shall feel right peeved if any other person indulges in anything of that kind.

I don't think I am alone in this attitude. Many years ago I read one of William Henry Drummond's habitant poems, "Little Bateese." The grandfather mildly directs the little boy's attention to all his mischievous acts during the day.

"So chase de chicken," he says, "an' make dem scare, an' do what you like wit' your ol' gran'pere. For w'en you're big feller, he won't be dere, Little Bateese!"

I am sure this humane, grandfatherly attitude will be warmly applauded by all those who have four and a half year old little boys, or little girls who are more adorable and, if possible, more aggravating than their brothers. The same attitude will be whole heartedly condemned as so much drivel, by those who do not have at least one or a pair of wreckers.

The evening session was designed primarily to slow them down to landing speed so that they might be bundled into bed. Up to that time, one might just as well attempt to catch a pair of young hawks, or, if you are a fisherman, a pair of eels. Usually after a half hour's session on my lap, they are willing to climb the stairs and tumble into their beds.

Up to the present I have not attempted to keep actual count of the number of questions asked and answered at one of these sessions. Is a gorilla as strong as an elephant? Could a gorilla kill an elephant? When I'm a big man I can kill all the gorillas with my axe. How old is Santa Claus? Where does he live? Why? How does he climb back up the chimney? Is he coming down our chimney? Why? Between questions they argue over who is going to own what.

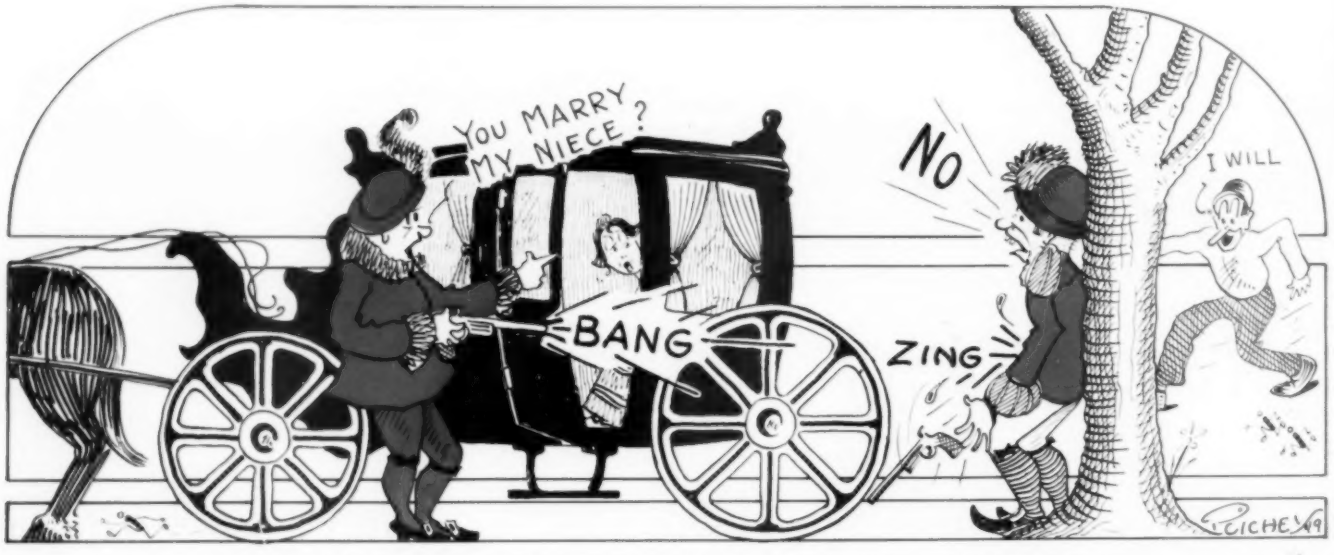
The most peculiar feature about this argument is that none of the objects is available, or ever will become their property. One lad specializes in trains. In various magazines, especially in the advertising pages, he sees the pictures of engines, coaches, sleeping cars, dining cars, observation cars, and freight trains. They are all his property. Occasionally, but not very often, he allows his partner to ride one of these trains, at some time in the vague and indefinite future. The magical future usually referred to as "When I'm a big man."

The other lad specializes in cranes, dump trucks and earth moving machinery. He is going to be the driver or engineer and maybe—he will not make a definite promise—but maybe, he will allow his dear little brother to sit in the driver's seat on one of these mechanical marvels and drive it all over the country.

Some times after they have been put away for the night, I sit in my chair and idly speculate on where the boys will be and what they will be doing, 15, 20 and 30 years from the present. Then I leave the main highway and wander down a memory lane that still is as bright and fragrant as it was when I first passed through in the happy, golden years. When I asked Bill one time if he ever indulged in this form of day dreaming over the past, he said, "No, indeed. What's past, is passed. Viewing the present, and trying to sneak a view into the future are legitimate, if useless forms of entertainment. Wasting time gawking back into the past is the height of something or other.

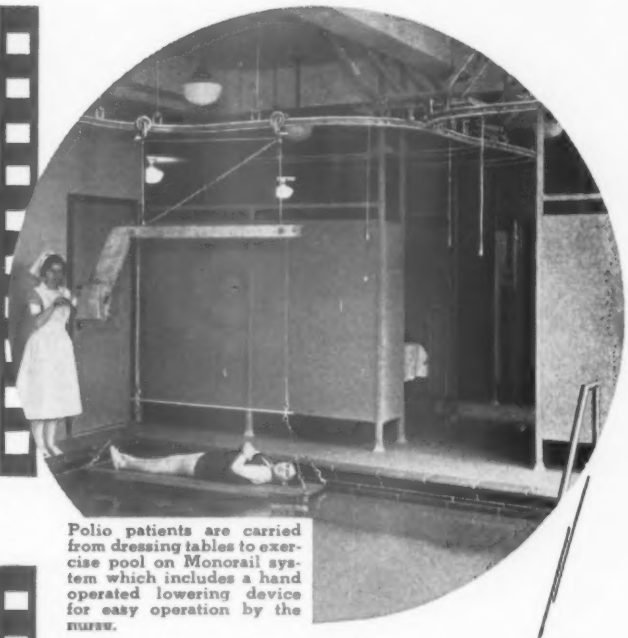
"This here now attempt to peer into the future," he continued, "or

(*Continued on page* 202)



Apparently the only item missing from this spirited illustration is a sign, Body by Fisher

Another demonstration of the MonoTractor drive includes a swinging jib for passage of the carrier over a truck for removal of 2 ton bundles of sheet steel. An electric hoist and a Windsor sheet grab are used.



Polio patients are carried from dressing tables to exercise pool on Monorail system which includes a hand operated lowering device for easy operation by the nurse.

This twin-bridge 5 ton crane is 160 feet long operating on 9 runways. Two carriers, each centered between a pair of crane trucks, can make a lift of 10 tons as shown.

Fruit, unloaded from cars on special trolley racks, rolls around MonoRail curve to a drop section where the racks are lowered to basement tracks. The racks then roll by gravity to ripening rooms.

Try

UP AND OVER HANDLING

before you decide upon any material handling equipment....

Our 16 mm black and white twenty minute sound picture will bring to you the complete story of American MonoRail overhead handling. If you are in the market for any material handling equipment, see our movie first. We will gladly loan you the film for showing in your offices at a time most suited to your convenience. Please drop us a line.

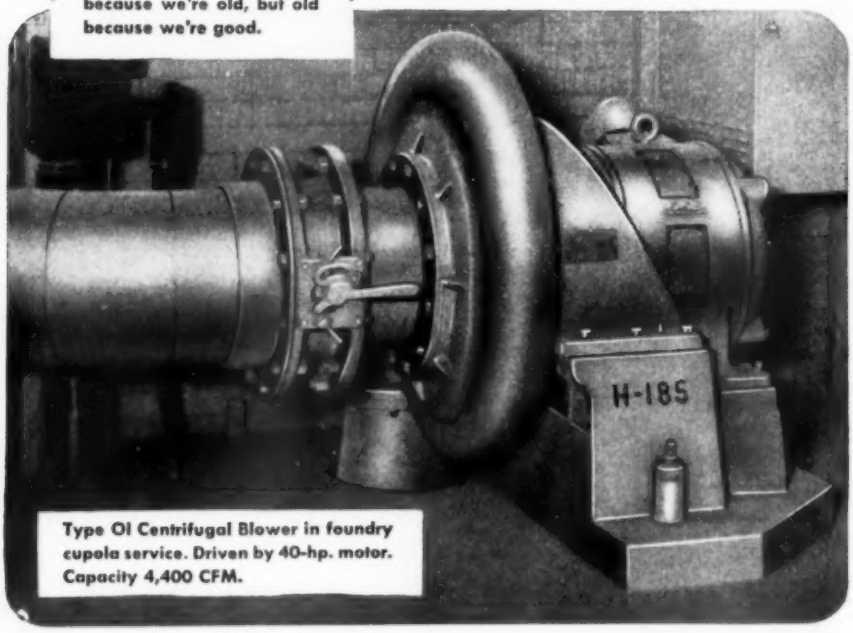
*UP and OVER is the title of our 20 minute 16 mm sound film.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE **CLEVELAND 7, OHIO**

Oil was first produced by drilling in 1859, five years after the first Roots Blower was built. We're not good because we're old, but old because we're good.

NO "HEDGING" ON BLOWER QUESTIONS FROM *R-C dual-ability*



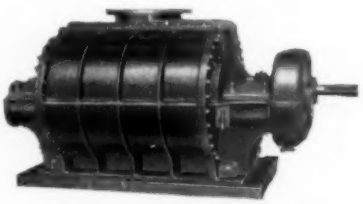
Type OI Centrifugal Blower in foundry cupola service. Driven by 40-hp. motor. Capacity 4,400 CFM.

When you ask Roots-Connersville sales engineers about blowers for foundry and cupola applications, you'll get unbiased answers, without "hedging" between Centrifugal and Rotary Positive equipment.

That's because of our *dual-ability* to design and build both types. We recommend whichever is best suited to the specific application, and we are the only blower builders that can offer you this important *dual choice* . . . an exclusive advantage which usually saves time, money and trouble.

You'll obtain outstanding performance from R-C equipment, too . . . the result of 94 years of experience, plus initiative and advance thinking of alert engineers and designers.

Send for Bulletin 120-23-B-11, which gives complete details on R-C Cupola Blowers.



This Type RCS Rotary Positive Blower is typical of the wide range of sizes available for foundry cupola applications.

ROOTS-CONNERSVILLE BLOWER CORPORATION
902 Madison Avenue • Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854
ROTARY CENTRIFUGAL
BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

• • ONE OF THE DRESSER INDUSTRIES • •

(*Continued from page* 200)

the pretense on the part of certain people that they had this power, always has been practiced, or at least as far back as we have any record. With the exception of a few journeymen prophets who flourished in the olden time and occasionally hit the jack pot, the propheteering business did not offer any encouragement to aspiring youths. You never hear of an apprentice prophet. You never hear of how the journeymen prophets learned the trade. You never heard of any apprentice ratio. For example, one to each five journeymen and one to the shop. You never heard.—"

"I have heard enough," I said, "for at least one day. Conditions have changed so much in the last 20 or 30 years that I don't believe any person has the answer to the apprentice problem. In the so-called good old days every shop had a waiting list of boys anxious to learn the molding trade. The waiting list has been dwindling steadily, until today you have to set a snare, a dead fall or a trap of some kind to catch a modern high school youth with the object of making a foundryman."

"Well," said Bill, "I'll tell you. Every problem has a way of solving itself, if you only have patience. I went to a meeting one time—to tell the whole truth I was dragged—where an attractive young lady read extracts from a book with a green cover. After each reading she closed the book and commented on the text kind of free hand. In a general way I gathered that every man's life is laid out in advance. He thinks he is exercising a free choice. As a matter of fact circumstances lead or force him into a line of action which he never contemplated. For example, how many men do you know, who learned the molding trade and after 10, 20 or 30 years quit the shop and started raising chickens, or vegetables, pigs or rabbits. You will find them in police stations, in elevators and in gas stations. Now and again a foxy lad marries a rich widow. Take your own case. You start off as a molder and end up as writer and editor."

"I think I can venture a guess on the title of the book with the green cover. Just to make sure I shall appreciate your kindness in mentioning a few definite quotations as presented by the young lady (color of costume not given). Dash it all, my good man, you hardly could expect me to recognize a book because it had a green cover. Never mind the outside

(*Continued on page* 204)

Announcing—

. . . . A NEW TECHNICAL SERVICE TO FOUNDRY SAND USERS

We are in business to sell tonnages of sand and we realize that our success depends on the results you obtain. We place our sand specialists at your disposal to help you correct difficulties which may have arisen through the use of sands not suited to your particular requirements. We specialize in semi-synthetic and synthetic sands for core room and molding practice and are able to supply you with the proper sand for your needs.

AMERICAN SILICA SANDS

The American Silica Sand Company has served the foundry industry exclusively for thirty years and production at our Ottawa district pits enables us to give you prompt delivery *at any time.*

We invite your attention to the accompanying coupon. There is no obligation on your part. Give us the opportunity to cooperate with you on your sand problems.

THE AMERICAN SILICA SAND COMPANY

Producers of Dried and Crude Silica Sands

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We Invite Your Inquiry

The American Silica Sand Company
Attention: Fred G. Kramer, Technical Adviser
Central Life Bldg., Ottawa, Ill.

Okay, please DO have one of your sand technicians call on us in the near future. We are especially interested in:
( ) Core Room Sands ( ) Molding Sands

Name .....*Title* .....

Company .....*Address* .....

MATERIAL HANDLING News®

This versatile hopper attachment used for sand-charging furnaces and dumping waste, enabled an Indiana foundry to step up production and cut costs materially.

Palletization of heavy castings and a Clark 7000-lb. fork-lift truck, eliminated several handling operations for both the foundry and its customers.

YOU'LL FIND THE *Material Handling News* stimulating and helpful—a copy is yours for the asking.

PATTERN FOR PLUS PROFITS—Increased productive capacity — Greater storage facilities through effective utilization of air rights — Reduced demurrage charges — Fewer accidents and damage losses! All these benefits are enjoyed by users of Clark fork-lift trucks. To learn how you, too, may enjoy them in your business, you have only to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 16, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

(*Continued from page* 202)

of the book. Just touch on some of the stuff on the inside. You probably will be surprised to learn that practically all book reviewers use that system."

"What system?"

"A few of the plodding type reviewers flip the pages and read a paragraph, or part of a paragraph here and there. The bright boys, the sharpies, crib some of the material on the jacket blurb and let it go at that. I could worm the information out of you with 20 questions, but I have a suspicion each question would lead you down some side path and end up in a swamp, or some other place of an equally disagreeable character. Bearing these little gems of

Time out for physical culture

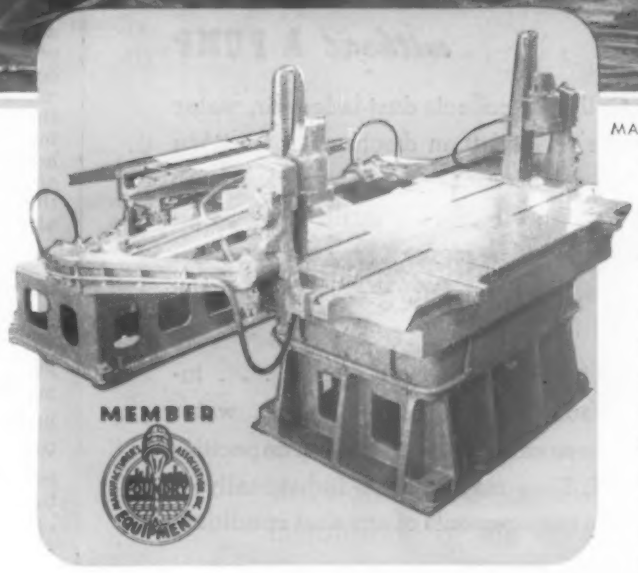
advice in mind, you should be able to glide through the job in a highly satisfactory manner. Do I make myself clear?"

"O.K. my boy. Brace yourself, here she comes. The main character got tired of a life spent in lying on his back, tootling on a flute and supposedly minding his father's sheep. Wolves came down from the hills at regular intervals and retired with a bit of fresh meat to carry them over the week-end. Our hero's father did not like this. He spoke sharply to the boy on several occasions. One night Severa Sextus y Thomas Alexander Potassium Chloride Maria Dolores—for that indeed was the hero's name—took a gander down the main road. When he came to the first cross road he turned left. A big black coach with the horses dripping foam pulled up alongside. A big, husky guy dressed in style, hops out, and tells Severa Sextus, etc., that he must marry the big fella's niece right

(*Continued on page* 206)

This Foundry Is A Good Place To Work

MAYNARD ELECTRIC STEEL CASTING CO.



• This modern Milwaukee foundry is the largest producer of electric steel castings in the area. Its capacity, using 4-ton electric furnaces, is 1500 tons per month. Largest percentage of production goes into castings for power shovels — other castings being used in hydro-electric, steam turbine and mining machinery applications.

An elaborate dust collection system is one of several reasons this foundry is a good place to work. This system operates throughout the plant . . . shakeout, sand blast rooms, furnace smoke, grinders, etc. Concrete floors are used throughout most of the plant, whose property covers 14 acres. Flexible production facilities enable the plant to turn out castings ranging from under one pound to 12,000 pounds. There are 550 employees. A working committee of 20 men represents all employees at regular bi-monthly meetings, to discuss details of plant working conditions. Careful consideration is given to all suggestions.

The Herman Jarr roll-over machine illustrated is typical of the 12 machines this plant uses, ranging from 1500 to 10,000 pounds' capacity. There are several points to remember about *all* Herman machines: No power is required for the roll-back operation; Extremely long pattern draw distance; Hydraulic roll-over and pattern draw permits smooth, easily controlled operation; One rotary valve handle controls the complete operation. For added information, just get in touch with us at the address below. Herman machines have made their way by the way they're made.

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

RECIRCULATES WATER *without* A PUMP

The Uni-Wash Dust Collector collects dust-laden air, water washes it twice, dries the air and then discharges it *within one compact unit.* The water is continuously recirculated by suction from the exhauster fan . . . no pump to clog and maintain. Another important feature—all dirt is removed from the air before it reaches the fan, thus reducing fan maintenance.

Uni-Wash Dust Collectors are assembled units . . . installation requires the connection of a power line, water source and drain only. These units are available in capacities from 500 to 30,000 CFM. They may be used individually or in combination to meet the requirements of any dust condition.

ENGINEERED SYSTEMS—

Newcomb-Detroit can engineer your complete dust collecting system, then build and install it. They are equipped to engineer and build systems requiring all types of foundry equipment . . . core and mold ovens, dust collecting equipment, shake-out booths, heaters, etc. Whatever your needs, when you call Newcomb-Detroit you are sure of the same thoughtful workmanship that has gone into thousands of Newcomb installations successfully operating in practically every industry.

Established 1912

NEWCOMB-DETROIT COMPANY

Grand Rapids Division—Plant
GRAND RAPIDS, MICH.

Main Office and Plant
5741 Russell Street
DETROIT 11, MICHIGAN

Western Sales Office
CHICAGO, Ill.

(*Continued from page* 204)

there and then, or else! Severa, the dope, said 'No.' The big fellow pulled out a pair of big pistols, offered one to Sev., and so forth, and then shot him as dead as the Cid.

"When Severa came out of his dream, he decided to start again and take the right hand road. This trip and another on the straightway ended in the same manner. He decided to return to his father's house. One day while his wife was hanging out the clothes in the yard, she heard a shot. She rushed into the house and found the lad as dead as a mackerel, with a big long pistol by his side. The same pistol that figured in all his dreams."

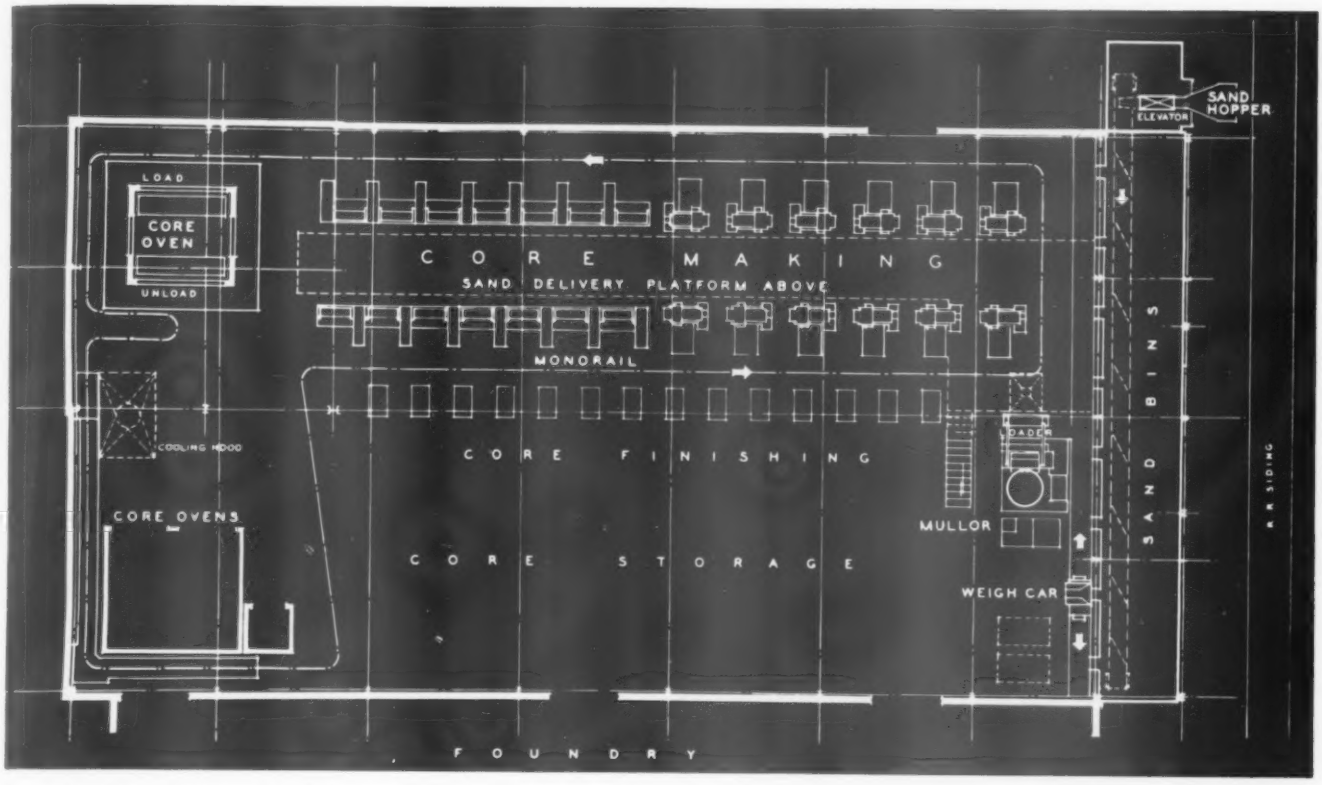
"That is 'The Roads of Destiny,' a story by a master writing man, O. Henry. The general idea is to show your fate is laid out in advance and will overtake you, irrespective which road you follow. Every now and again I rub up against something the same kind of stuff. Here is a letter I had the other day. The writer is thinking of starting a small foundry and he would like to know what I think of the idea:

I am a molder at present living in a small southwestern town and not working at the trade. In this mining country with the nearest foundry 140 miles away, I have been considering the problem of starting a small jobbing foundry. Unfortunately, I never had any experience with the office or business end of a foundry, and therefore do not know how to go about establishing a plant. Certainly I shall be very grateful for any advice you care to give on this particular problem. I wrote him as follows:

One of the classic legends connected with *Punch,* venerable British comic periodical, from a period when men's minds do not run to the contrary, is based on a problem somewhat similar to your's. A correspondent contemplating matrimony asked the old boy to send full instructions on all the etiquette features connected with the event. Mr. Punch gave the subject his most serious consideration and then sent his correspondent a single sheet of paper with the single word D-O-N-'T written across the center.

While we admire your enterprise and ambition, and under other circumstances would be inclined to encourage you, it is only fair to point out that in your case you have two strikes against you: 1—You are not familiar with the commerical side of the foundry business. 2 — You are located in a territory where apparently the demand for castings is about as brisk as the demand for straw hats, grand pianos and golf clubs is among the Eskimos. To slightly paraphrase a

(*Concluded on page* 208)



Foundry Core Room of A Midwest Foundry

For greater efficiency and production, this foundry core room was replanned and engineered for efficient flow and better material handling.

Thru the combined efforts of the owner's production engineers and Giffels & Vallet, Inc., improved production was achieved thru the development of a new layout and the effective installation of the core room equipment.

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INDUSTRIAL ENGINEERING DIVISION
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. . . and the best pattern lumber comes from Dougherty. Processed in our own kilns . . . using only old growth logs to give you patterns that resist cracking and warping . . . here's lumber that will reduce pattern costs because it is easier to work and has fewer flaws.

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YOUNGSTOWN, OHIO
PITTSBURGH, PA.
WILLOW RANCH, CALIF.
LAKEVIEW, OREGON

(*Concluded from page* 206)

certain famous saying "What does it profit a man to make a perfect casting if there is no customer to take it off his hands at a profit?" In *Penton's Foundry List* we find only one foundry listed for your entire state.

Foundrymen roughly are divided into two classes, those who are keenly and only interested in technical features, and those who regard castings as they regard any other commodity, something to be sold at a profitable price. Instances of men combining both viewpoints are comparatively rare. In the average combination one man devotes his skill, experience and energy to the actual production of the castings. His partner buys supplies, secures orders for castings, and sells the castings without knowing or caring how they were produced. Assuming that a molder, skilled at his trade, but unfamiliar with other features of the business, were to start a foundry, the first pit in which he would fall would be the inability to set a price on the castings, a price fairly competitive from the customer's standpoint, and yet a price to leave a fair margin of profit. Without any former experience he inevitably would overlook several cost producing items.

However, if you feel justified in following your inclination, the first logical move would be to make a survey and determine the extent of a possible market. Obviously, prospect of a definite volume of business is a requisite foundation on which to establish a business. A complete guide to sources of supplies and equipment is published in every issue of THE FOUNDRY. Incidentally, practically all these firms have experts on their staffs, men who cheerfully instruct foundrymen in the use of their goods.

We realize you have the final word in any discussion. You can say, "What has been done before can be done again. Many a man started on a shoestring and ended in a pair of seven league boots."

Book Review

Designing for Alcoa Die Castings, published by Aluminum Co. of America, Pittsburgh, cloth, 188 pages, 5½ x 8½ in. Price $1.

Intended to provide the fundamentals of accumulated technical data acquired on aluminum and magnesium die castings and die casting practice, this book outlines the basic principles that the buyer of light metal die castings can use advantageously in purchasing such castings and in engineering conferences with the die caster.

High Sipi I.Q.*

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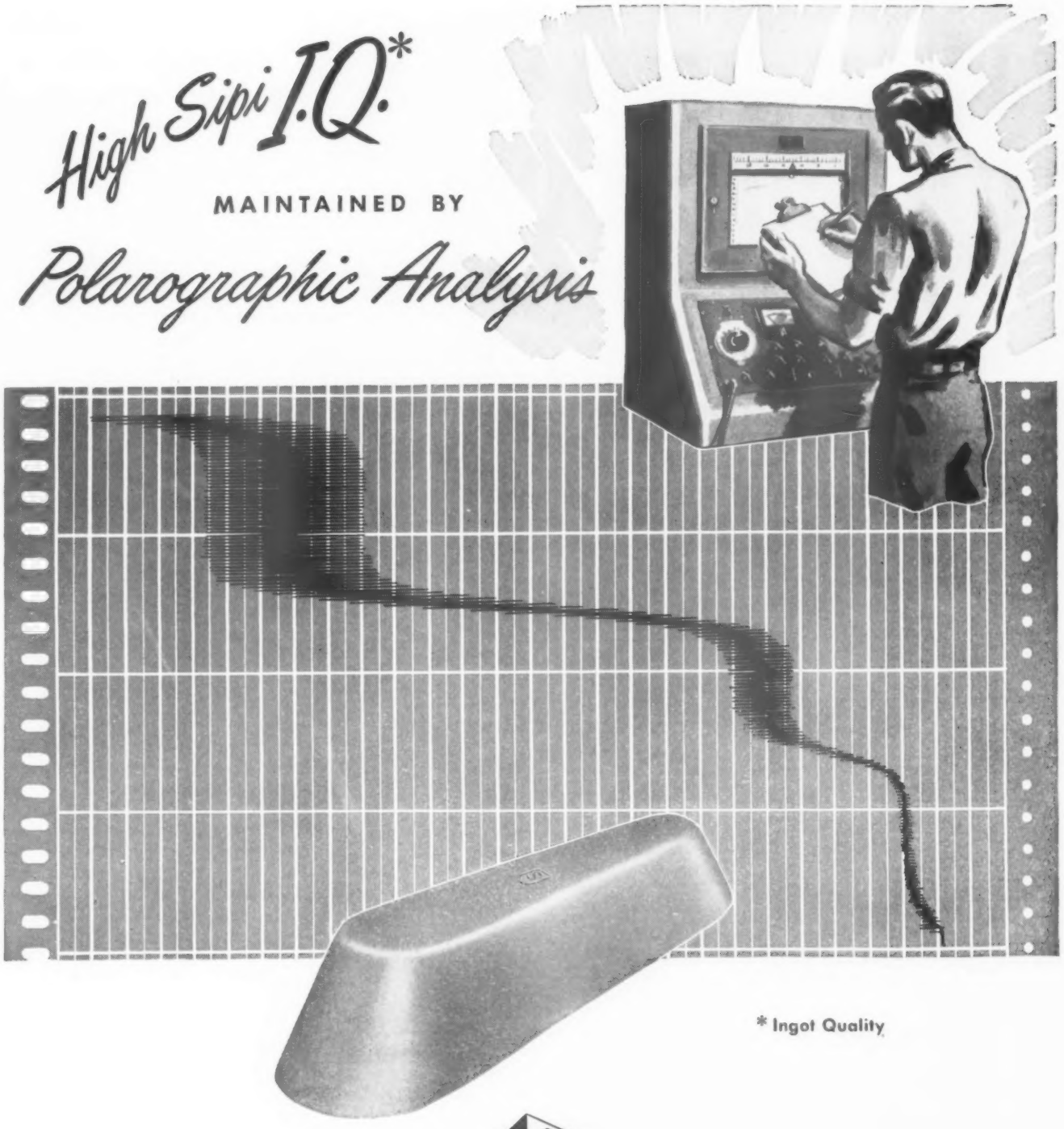

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The Polarograph detects, identifies, and measures impurities in alloys up to 1/10,000 per cent. Employed in the laboratory control of SIPI ALLOYS, it guarantees ingots of high quality . . . the first step in making sound castings.

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PATTERNS, MOLDING METHODS FOR STEEL CASTINGS

(*Continued from page* 93)

making the coreboxes to produce the job entirely in cores. In that respect, therefore, there is generally little to choose between a core assembly mold, and one made in dry or green sand from a pattern. As a rule, however, the cost of the bonding materials added to the sand will be higher for all-core work than for making integral molds. The arbors or rods required to reinforce the cores, too, are a more expensive item, all told, than the flasks used in regular molding practice. This is especially true since new arbors may be required for each casting, or at least money must be spent to reassemble used ones. Core rods, to be sure, can be salvaged, and always are, but when large numbers of cores are being made, the cost of straightening and handling the rods is far greater than the labor expended on keeping flasks in shape.

Labor Cost Is Greater

Again the cost of labor and supervision required to ram up a given volume of sand is much greater when the mold is formed entirely of cores than when the sand is placed in flasks with modern equipment. This is true even when the cores are produced with adequate machines such as jolters or slingers. One reason for this is that the coremaker has to spend a lot of time on each core in placing the reinforcing rods, which often must be wired together, in setting the lifting rods, etc. Even counting the labor cost of setting gaggers in a cope, it is generally cheaper to make a one-piece mold than to produce the equivalent number of cores. In fact, in many cases where mechanical equipment cannot be used to ram the sand, but a cope and drag must be made by hand, it will still be found no more expensive, or even cheaper, to produce a regular mold than to make the cores for an assembled job.

It is not only in the coreroom proper that the labor and supervision costs of all-core work are high, for to handle and keep track of the hundreds, even thousands, of separate pieces involved in this practice, and deliver them to the foundry at the proper time and in the right sequence, requires a large force of men. Obviously, to handle a two or three-part mold and the cores that go with it, is a

(*Continued on page* 214)

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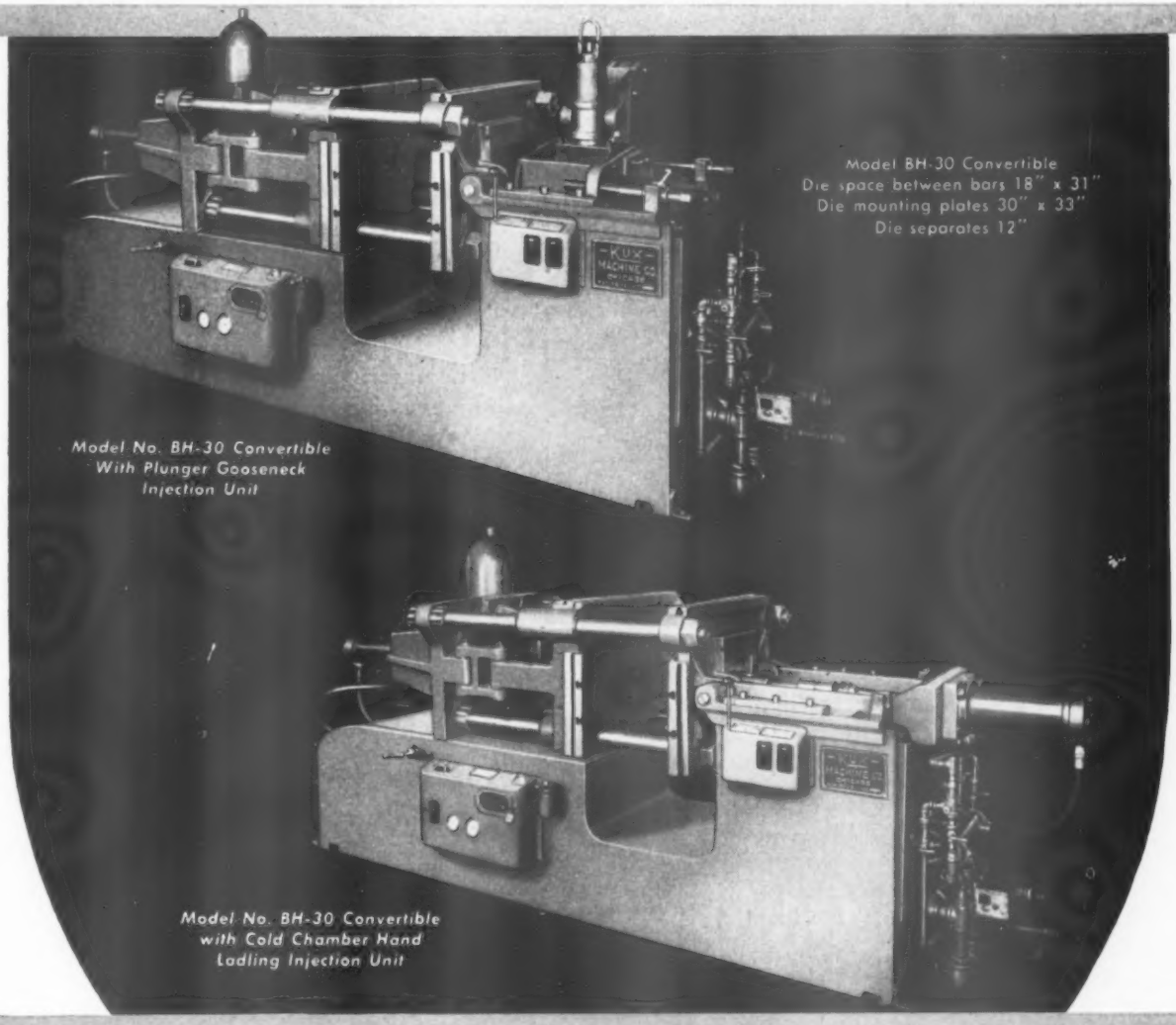

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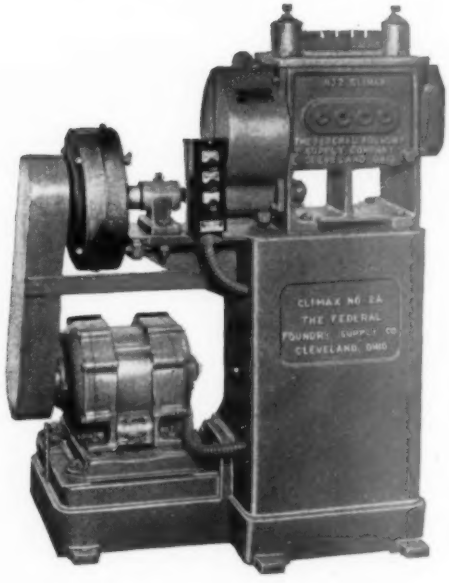

Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely — by unskilled labor. A complete descriptive circular is yours for the asking.

The "Lightning" Clamp

The "Holdtite" Clamp

CLAMPS

Federal offers two types of flask clamps.

The "Lightning" clamp is an eccentric type, requiring no wedges and available in two sizes: No. 2, 8" to 12" and No. 3, 12" to 20".

The "Holdtite" is an adjustable clamp designed for use with wedges and is also offered in two sizes: No. 1, 13" to 23" and No. 0, 18" to 33".

Both clamps made of sturdy malleable iron, rigidly reinforced to prevent distortion.

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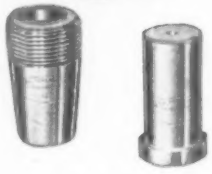

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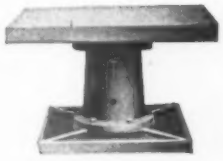

SHUR-SPOT SPRUE

Designed for use on squeezer-made molds, Shur-Spot squeezes right down with the sand. When the squeezer board is removed, the Shur-Spot pops up and can be lifted right out. The result is a fully completed and properly located pouring sprue that requires no finishing. Shur-Spot Sprue eliminates danger of falling sand.

For complete information on the Shur-Spot Sprue, write for the circular on this low-priced easy-to-use item.

FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown here. Immediate delivery — write for details.

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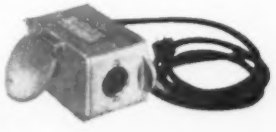
Federal also has a new "convenience outlet knee switch." No taping, soldering or wiring. Plug in—that's all. Carried in stock. $7.50 each, f.o.b. Cleveland, Ohio.



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(*Continued from page* 210)

far easier task, which can be carried out by a much smaller gang. Any foundryman knows, too, that the breakage of cores in handling is always high, and this is another factor tending to increase the cost of all-core work.

Unless a one-piece mold is so complicated as to require a most unusual number of cores, it is much cheaper to core up and finish a job molded in one piece, than it is to set the whole thing up in segments, gaging and checking at every step to ensure proper alignment and spacing of the cores. When a number of castings are to be made from a single set of coreboxes, of course, this is in part taken care of by building a framework of metal or concrete slabs set in the foundry floor, and setting the cores in it, as illustrated in Fig. 44, a view of a form used to set up the cores for a very large railroad casting. Such a form performs the double function of properly locating the cores and of holding them in place against the ferrostatic pressure of the molten metal when the mold is poured.

The large cores used in core assembly molds, however, are often none too accurate to dimension, so that even with forms to assist the core setters a great deal of gaging is necessary; therefore the forms save only part of the core setting time. Obviously, however, forms do eliminate much of the work of placing and tying together the plates and binders that must be used to hold a core assembly job together, since with a form it is only necessary to set and tie down binders across the top of the job to keep the upper cores in place.

Even if the shop has orders for enough of a single casting to justify the expense of building a preplaced form, there is a certain disadvantage in the fact forms are not readily and cheaply moved about as flasks are, so that once a given area in the shop is taken up by a form, any failure to use it steadily costs money because valuable space is then standing idle. Delays on account of broken or lost cores, changes in design involving alterations to coreboxes, time spent waiting to check a casting for dimensions, and so on, all result in keeping a certain number of forms, and therefore foundry space, idle. Rammed-up flasks, on the other hand, can be set down almost anywhere, and one job can readily be substituted for another at any given point.

Finally, as will be discussed in more detail later, joints between cores are seldom good enough to prevent metal getting into them and forming fins on the castings. These fins frequently result in hot tears and cracks in the castings, sometimes making it necessary to scrap a casting, and in any case involving extra expense in the cleaning room, and extra welding costs.

All-core molding, therefore, is chiefly advantageous in cases where the flasks required for integral molding would be so large and heavy that the cost of making and handling them would be prohibitive, or their weight when rammed up would be beyond the capacity of the hoisting equipment of the shop. Even when the job is too big to be handled in flasks, however, an all-core job need not necessarily be the method chosen, since bedding in a pattern should always be considered. The cost of making a bedded-in mold will in many cases be less than that of a core assembly, and the handling problem can usually be taken care of by making the cope in two or more sections. Since in making a bedded-in mold only the cope need be raised, the available cranes will usually be able to do the work satisfactorily.

Use Number of Coreboxes

In some cases, castings are molded with integral drags, but instead of making regular copes, core assemblies are substituted to close the mold. If the outline of the top of the casting is complicated, a number of core boxes will be required to make the necessary cores. Under these circumstances the economy of the method must be carefully studied since often it will be found that cover cores will cost more than copes, for the same reasons that make a complete core assembly less economical than a regular molded job. On the other hand, when only plain flat cores are needed and one box can be used to produce a number of them, the choice of cover cores instead of a cope may be justified. However, in view of the many factors that make it more expensive to mold and place a given volume of sand in individual cores than in one or two sections of flask, the foundryman should be very sure of his ground before jumping to the conclusion that cover cores should be chosen to close any particular job.

Occasionally, also, flat cover cores may be selected instead of a rammed green sand cope, because they are

(*Continued on page* 216)

DRAWING A PATTERN at foundry of Western Pattern & Foundry Co., Seattle. The company, which recently marked its 40th year, was founded in 1908 by Roy C. and Earl Schwenk, who have continued the operations since then. The well equipped job shop includes a nonferrous foundry and machine shop on the ground floor of a 60 x 148-ft building, with pattern shop and offices on the second floor.

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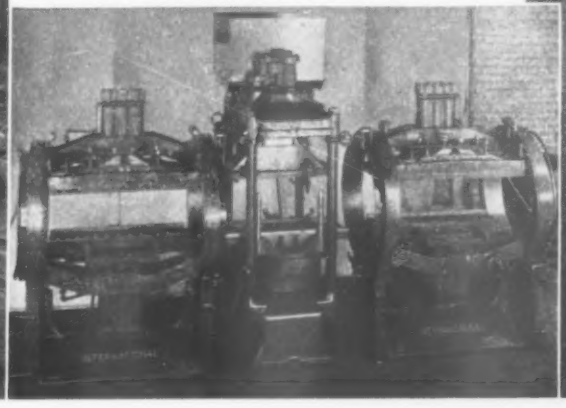

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(*Continued from page* 214)

less likely to spall off when the mold is poured. A comparatively deep mold that requires some time to fill, so that the cope sand is highly heated before the steel comes in contact with it, is especially liable to this sort of trouble. In this case, of course, a dry sand cope should be used instead of dry sand cores and as a rule would resist spalling equally well. However, a cope often occupies more space in the drying ovens, requires more sand and therefore may cost more to produce than the cover cores required to close the mold. This is particularly true when the casting is one that the molder describes as a "great big nothin" which must be molded in a large flask, but is capable of being closed by a comparatively few cores.

Use Skeleton Patterns

In certain jobs made by bedding in, such for instance as large pipes and elbows, or casings for centrifugal pumps, a great saving in pattern costs can be made by the use of skeleton patterns. These are usually built in two pieces, one for cope and one for drag, but instead of a complete pattern, the outline is formed by a grid-work of intersecting ribs or bars, with large openings between them, so that the pattern at first sight looks like some sort of fantastically shaped bird cage. In many, if not most, cases, the drag, the interior core and the cope are all rammed up from this pattern, thereby saving the expense of a large corebox, as well as a great deal of lumber. Such a pattern, used to produce a part of a hydraulic turbine installation, is shown in Fig. 52.

The bottom part of such a pattern is set in the drag flask or in the foundry floor, and properly supported. The sand is then rammed under it, and brought up into the open spaces between the ribs of the skeleton. Through these openings the sand can be satisfactorily rammed beneath the ribs, and of course it it easily rammed hard under the open spaces. Strikes are then used to scrape the extra sand out of these spaces and bring it just level with the outside of the pattern. These strikes are flat pieces of wood whose ends rest on the ribs, and have an extension of proper width to reach to the desired level. Using the ribs as guides, the strike is worked back and forth in the opening until the projecting middle portion has scraped up the excess sand, which is then removed with the molder's trowel.

(*Continued on page* 219)

THE Redford CORE BLOWER

CARTRIDGE BENCH TYPE

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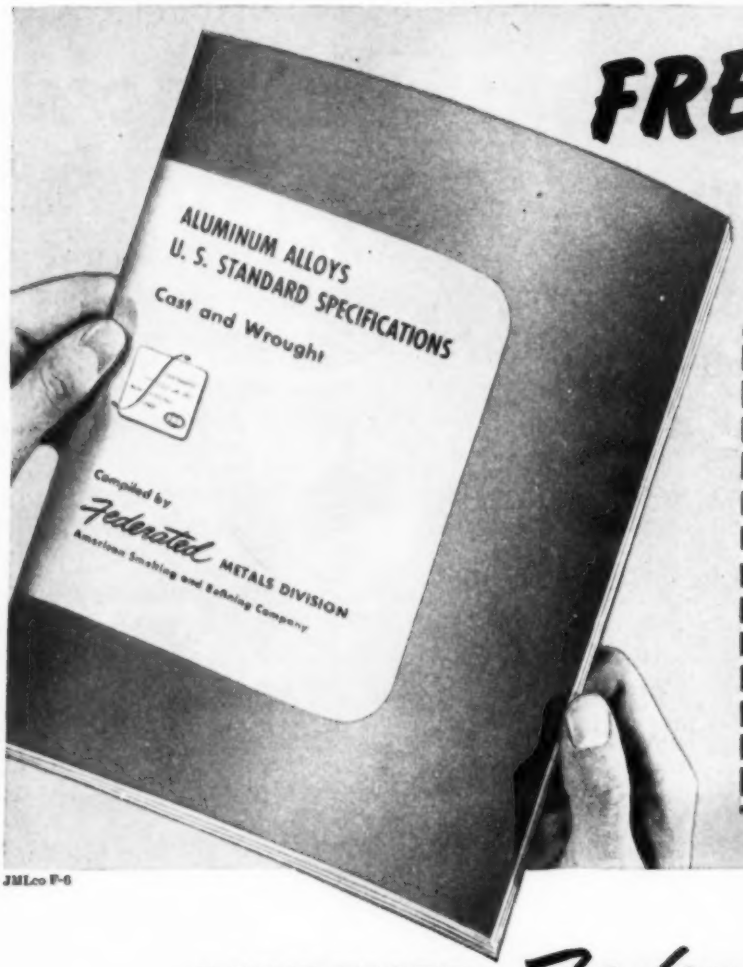

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(*Continued from page* 216)

If a set of strikes is to be used a number of times, the cutting edges are usually protected by thin steel plates screwed to the wood.

When the drag has been completed, weakly bonded sand is rammed into the openings between the ribs, and smoothed off even with their upper surface. Against this surface, part sand and part ribs, the sand for the core is rammed and built up with the necessary rods or arbors set in it, until the level of the joint is reached. The cope part of the pattern is then set in place, and the core finished by ramming the sand through the openings between the ribs of the skeleton. Strikes are again used to finish the core to the level of the bottom edges of the ribs, and the openings in the cope part of the pattern are filled with weakly bonded sand.

Core Supported on Prints

The cope flask is then set on, and the mold finished in the same way as it would have been if a complete pattern had been used. To provide support for the core when the mold is closed, prints are formed in the drag sand at the ends of the pattern, while this part of the mold is being made up, and the core is rammed against this sand, which is usually covered with heavy paper to form a proper parting. The portion of the core that is to fit into the print in the cope is shaped up by hand, and paper spread over it to allow the cope sand to lift away from it cleanly.

The cope is then lifted off and set on horses for finishing, and the upper half of the pattern raised off the core. The latter is lifted by means of rods built into it in the usual manner, and finally the rest of the pattern is removed from the drag. The sand between the ribs of the skeleton is of course knocked out as soon as the pattern is removed from the mold.

Occasionally, instead of closing up the openings in a skeleton pattern with sand, wood pieces made to fit these holes are inserted after the strikes have been used to bring the sand to the correct level. This practice can only be justified, however, when a great many castings are to be made from the pattern, and when there are not too many openings to be filled. A pattern built in this manner, and used for one-half of a centrifugal pump casing, is shown in Fig. 47. In this view can be seen the dividing line between the cope and drag parts of the pattern, the pads set on the cope portion to seat

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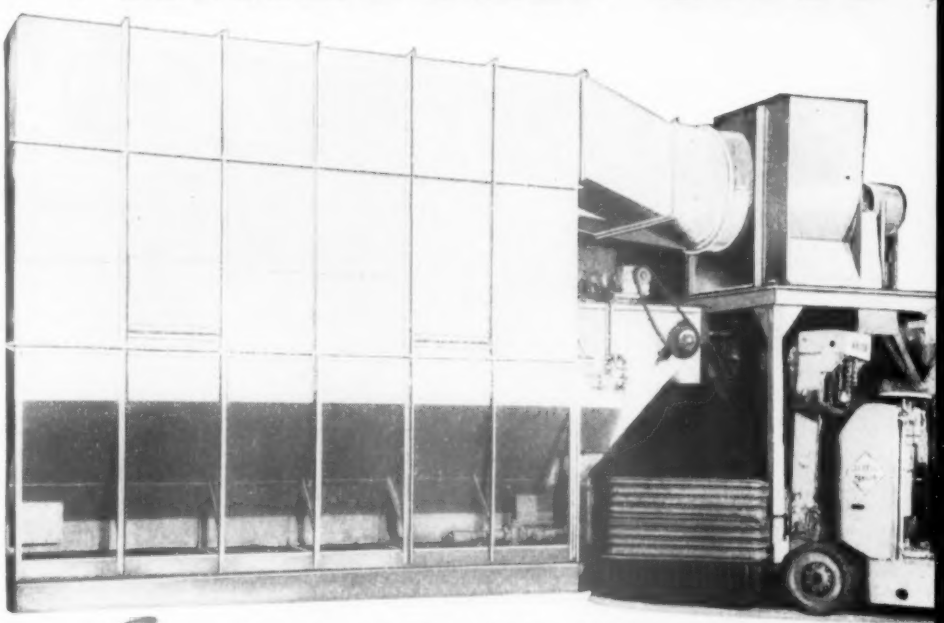

for SAND HANDLING and SHAKEOUT

Because it is made of stainless steel and *because* it is designed and manufactured for longer, corrosion-free operation, the new Schmieg 30,000 C.F.M. Centri-Merge Swirl Type Arrester illustrated is the best buy on the market. Stainless steel is your guarantee of long-range low maintenance costs. A Schmieg unit is easily installed to occupy a minimum of valuable floor space for the most efficient removal of dust and dirt from shakeout stations, sand handling and conditioning systems. Sludge disposal is perfectly simple—you use nothing more than a skid on a lift truck. We urge you to consider carefully the *dollar-saving advantages* of an investment in a Schmieg stainless steel Arrester Unit.

Consult Schmieg engineers regarding your problems of dust and fume control.

THE *best* AIR PURGE is CENTRI⊖MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

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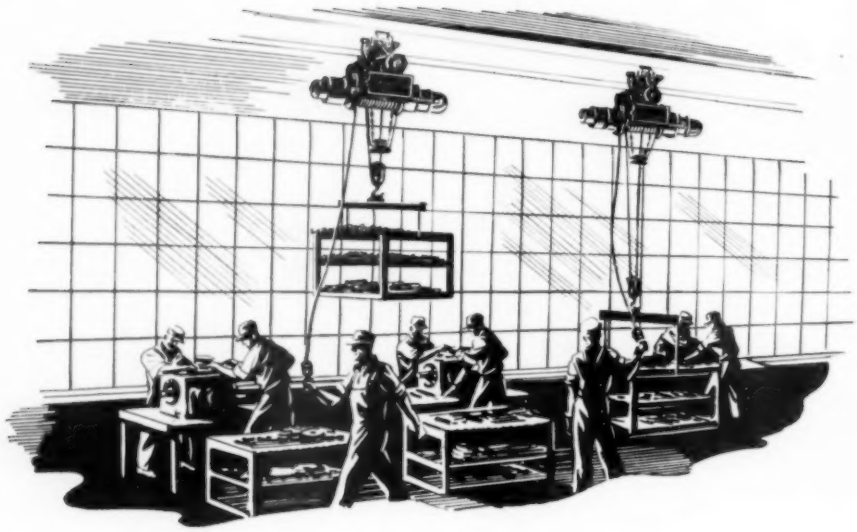
BREAK ASSEMBLY LINE BOTTLENECKS BEFORE THEY FORM



Be sure there is enough lift power and speed to feed parts or sub-assemblies to the main line at the correct tempo.

Will your need be for overhead cranes? What capacity? Or hoists? How large? How operated? From cabs— or from the floor with pendant controls?

The man best qualified to help you answer these queries is the Shepard Niles specialist. He has reference data to cover the performance of all three—and his mind is unprejudiced because he has sold all three for years. Let him help you plan!

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Makes and sells all three lifting tools for airborne shop loads.

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the head patterns, and one of the removable wood pieces resting near the opening it serves to close. Fig. 48 shows the method of bedding in the drag half of this pattern, Fig. 49 shows the cope half in place over the completed inner core, and Fig. 50 the inner core after removal of the cope part of the pattern.

In Fig. 52 is shown a pattern, part of which is a full skeleton, to be rammed up as described in the preceding paragraphs, and part a full pattern, made in halves to be bedded in with the skeleton portion and rammed up with it. The interior core of the solid portion of this job is made in a separate corebox, because of the difficulty of making it in a skeleton pattern like that used for the rest of the piece.

Adopt Another Method

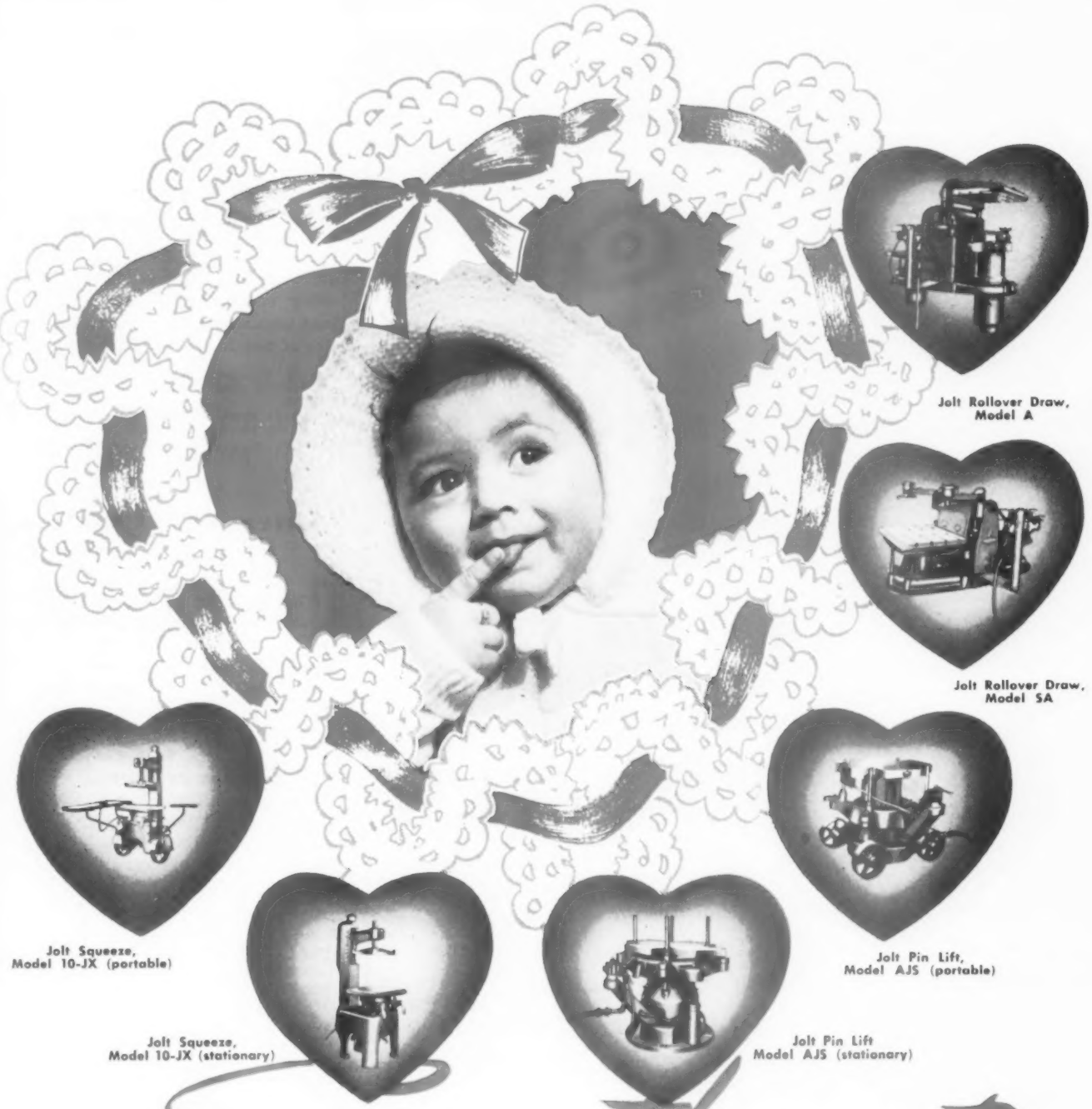
A modification of this method is often used in cases where large one-piece cores are required that would be hard to ram up from one end in complete coreboxes. A solid lower half of the box is made, and the upper half is built as a skeleton, with suitable strikes to finish off the sand to the proper level. When a core is to be made in a box of this type, the lower portion is first rammed up, with the necessary rods or integral arbor in place, and the sand is heaped up and rammed nearly to the level of the bars of the skeleton part. The latter is then set over the solid part of the box and clamped in position, the rest of the sand is placed and rammed through the openings in the skeleton, and finally the top of the sand is swept off level with the bottom surface of the skeleton bars.

The skeleton portion of the box is then removed, a frame put in its place and filled with loose sand, and a heavy rigid plate clamped over the frame. If necessary, a long flask may be used to reinforce this plate and keep it level. By rolling the whole assembly over, the core is left supported by the loose sand on the plate, which may then be set on the car of the drying oven.

Occasionally, a fairly long core made in this fashion is lifted from the bottom half of the box by means of suitable lifting bars and rings attached to the central arbor. To prevent the sand of such a core from falling off when it is lifted, the rods and gaggers attached to the central arbor must be strongly and rigidly tied on. A suitable frame is also required to support the core while it is being placed in the oven.

In molding with cement-bonded sand, the lower part of such a box

(*Concluded on page* 222)



Jolt Rollover Draw,
Model A

Jolt Rollover Draw,
Model SA

Jolt Squeeze,
Model 10-JX (portable)

Jolt Pin Lift,
Model AJS (portable)

Jolt Squeeze,
Model 10-JX (stationary)

Jolt Pin Lift
Model AJS (stationary)

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Everybody loves a Sweetheart!

In hundreds of the world's leading foundries Davenport molding machines are known as Sweethearts.

They save the back-breaking labor of men. They save money on cost records. They deliver to the customer better castings in less time at a lower cost.

Write today for our complete catalog and take a look at a Sweetheart of a molding machine.

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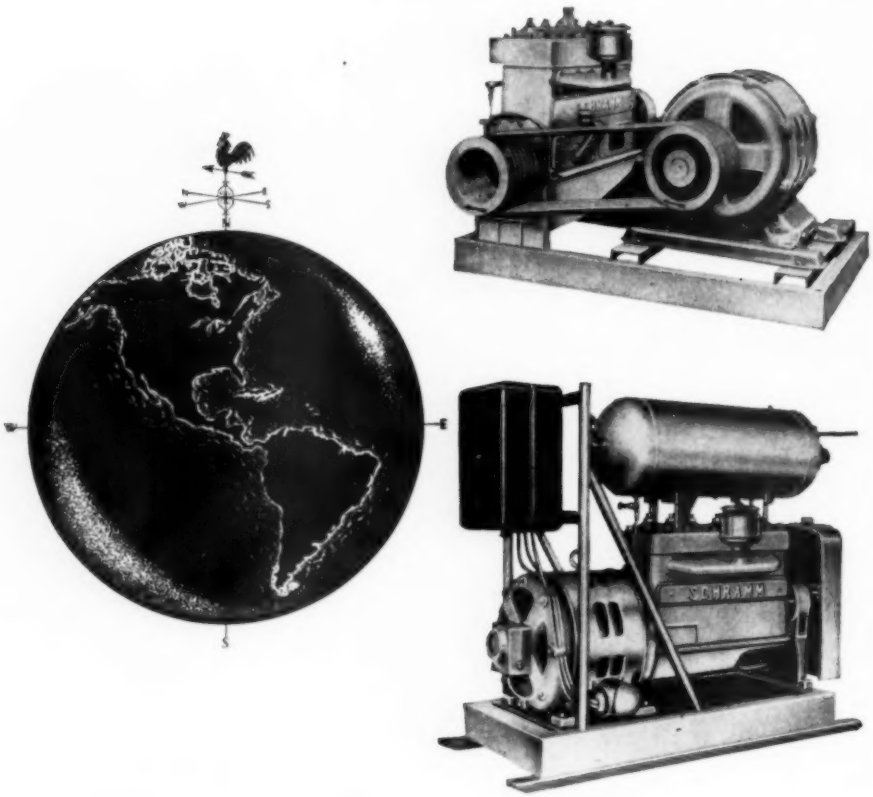

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At almost every turn you need compressed air!

The check list (at right) indicates some of the many compressed air jobs to be done, all of which are accomplished easily, quickly and economically with Schramm Air Compressors.

Here's *why* you profit, as others have, by using Schramm: they're compact, lightweight, easy to start; built for rugged jobs, to provide a continuous flow of air.

Important features include 100% water cooled; mechanical intake valve; forced feed lubrication and easy starting.

Performance everywhere has proved Schramm Air Compressors can do any compressed air job you require. Write today for list of models and sizes.

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- Steel Drilling
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- Scaling
- Chipping
- Caulking Boilers
- Cleaning Boiler Flues
- Cleaning Engine Generators
- Operating Air Hoists

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

(*Concluded from page 220*)

may sometimes be built up on the foundry floor out of chunks of old molds, covered with bonded sand, and shaped by means of sweeps or strikes. On this temporary box a skeleton frame is set to form the upper part of the core. When the order is completed, the molded part of the box is broken up. Skeleton patterns and coreboxes in general are quite widely employed in foundries using cement-bonded sand, as they lend themselves very well to the practice of bedding-in patterns.

Sources of Illustrations

Birdsboro Steel Foundry & Machine Co.—Fig. 46.

General Steel Castings Co.—Figs. 47, 48, 49, 50, 51, 52.

(*To be concluded next month*)

Interprets Code on Iron Castings

The following discussion which was published in the December, 1948 issue of *Mechanical Engineering* will be of interest since it pertains to an interpretation of a section of ASME Boiler Code relating to the application of gray iron castings, and a milestone in the advancement of gray cast iron for elevated temperature service. The interpretation was formulated by the Boiler Code Committee of the American Society of Mechanical Engineers:

Case No. 1076

(*Interpretation of Par. U-13h*)

Inquiry: Is it permissible, under Par. U-13 (h) of the Code, to use Classes 50 and 60 cast iron complying with ASTM Specification A 48-46 in the construction of unfired pressure vessels?

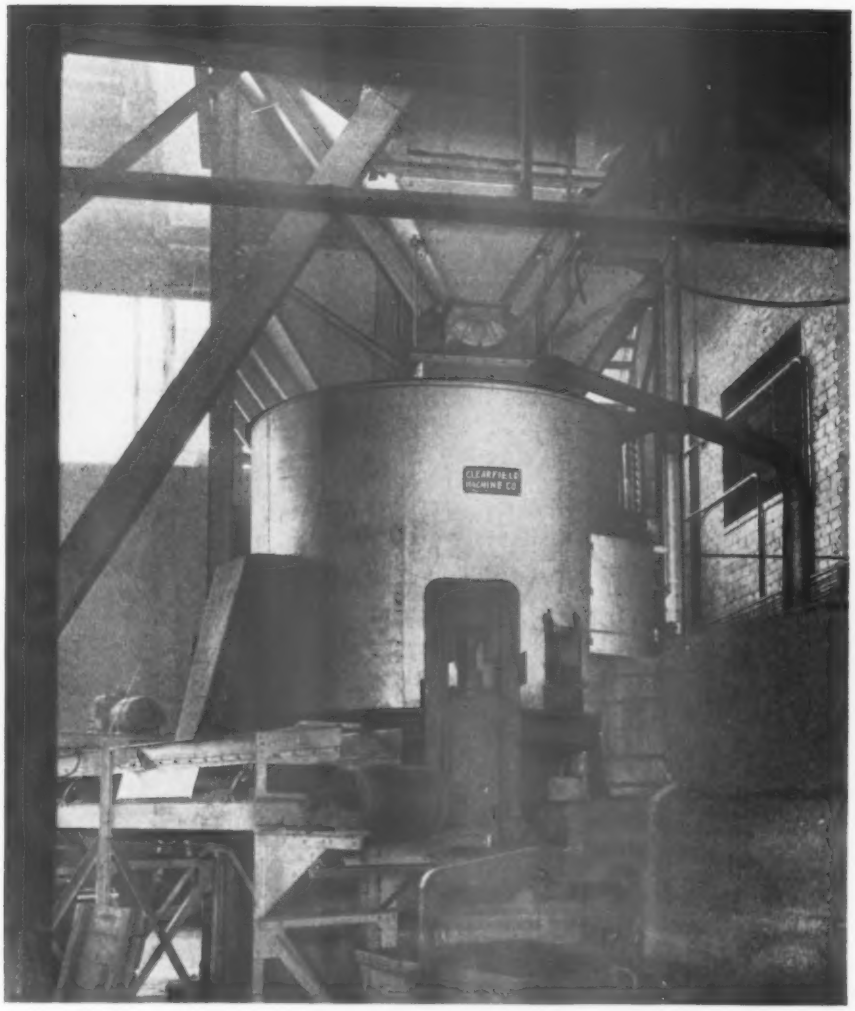
Reply: It is the opinion of the Committee that Classes 50 and 60 cast iron complying with ASTM Specifications A 48-46 may be used under Par. U-13(h) of the Code provided such castings are marked with the Class number and the producer's name or identification symbol. The following working stresses may be used:

Class	Max Tension	Max Bending	Max Compression
50	5000	7500	10,000
60	6000	9000	12,000

Castings and test bars shall be stress-relieved by placing them in a suitable furnace at a temperature not exceeding 400 degrees F. The heat-treating charge shall be uniformly heated to a temperature of not less than 900 degrees F nor more than 1050 degrees F. Castings shall be held above 900 degrees F for not less than 1 hour nor more than 2 hours per inch of thickness of the thickest section. The heating and cooling rates shall be uniform and shall not be more than 400 degrees F per hour for castings of 1 inch maximum section, nor more than 400 degrees F divided by the maximum thickness in inches for thicker castings.

you get better foundry sand from a

CLEARFIELD MIXER



This Clearfield 930 Mixer is the center of a complete molding sand conditioning system.

Sand which adheres firmly during both molding and pouring operations must have bond and moisture uniformly distributed. This is absolutely essential for good foundry work—and that's the type of sand which is turned out all the time by Clearfield Mixers.

Clearfield Mixers, with the famous revolving pan and vertically rotating mullers, are available in sizes and models to fit in perfectly with any production setup. So whether your needs are for small quantities of sand at infrequent intervals or a continuous large supply, write for Catalog No. 79 for complete information on the Clearfield Mixer which you require.

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MIXES, TEMPERS, AERATES

CLEARFIELD MACHINE COMPANY
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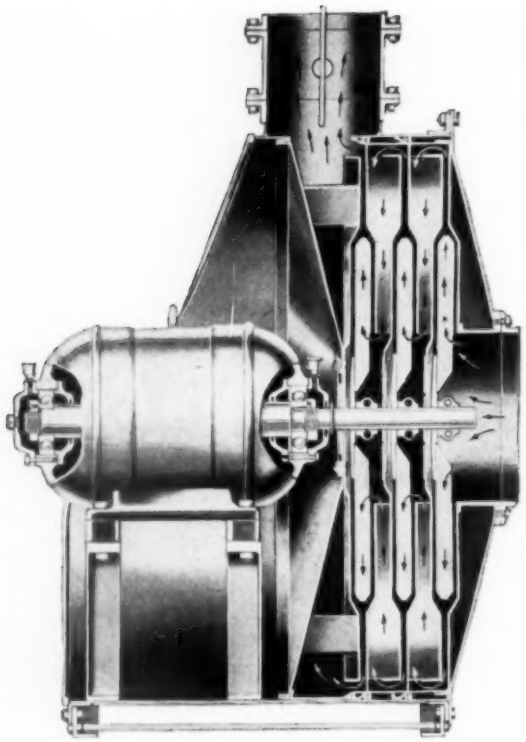

Why SPENCER TURBO-COMPRESSORS

Are Preferred in Foundries

A look at the inside of a Spencer Turbo indicates some of the reasons why they have been giving satisfactory service in foundries. There are only two ball bearings. When properly greased, the Spencer Turbo will run day in and day out with original test efficiency for years. In fact, many are still serving faithfully after 40 years' service. Note the wide clearances, the streamline flow of air, and all metal reinforced construction and the light weight impellers and low peripheral speeds. And remember that the Spencer uses power only in proportion to the work done and that balanced, quiet operation is inherent in the Spencer design.

ON CUPOLAS—Constant volumes of air are maintained by manually controlled gate valves. Calibrated ammeter indicates weight or volume. Automatic air weight control can be obtained when desired. Ask for the bulletins.

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Foundries	No. 112
Data Book	No. 107
Gas Boosters	No. 109
Four Bearing	No. 110
Blast Gates	No. 122
Technical Bulletin	No. 126

TURBO-COMPRESSORS

332-E

Foundrymen Form Management Groups

Gray iron foundry management executives in northwest Michigan recently formed a Muskegon group of Gray Iron Founders' Society with the following officers: Chairman—Donald A. Paull, Sealed Power Corp., Muskegon, Mich.; vice chairman—William R. Johnson, Campbell, Wyant & Cannon Foundry Co., Muskegon; secretary—Raymond E. Gilbert, Great Lakes Foundry & Machine Corp., Ludington, Mich.; treasurer—Clifford J. Lonnee, Clover Foundry Co., Muskegon, and membership committee chairman—David J. Vail, Campbell, Wyant & Cannon Foundry Co.

George W. Cannon, chairman, Campbell, Wyant & Cannon Foundry Co., reported briefly on the new foundry department being installed in the Muskegon trade school. The group visited the trade school foundry which is equipped with some of the most modern facilities.

Carl H. Spannaus, Fountain Iron & Brass Foundry, Pueblo, Colo., has been elected chairman of the newly organized Denver management group.

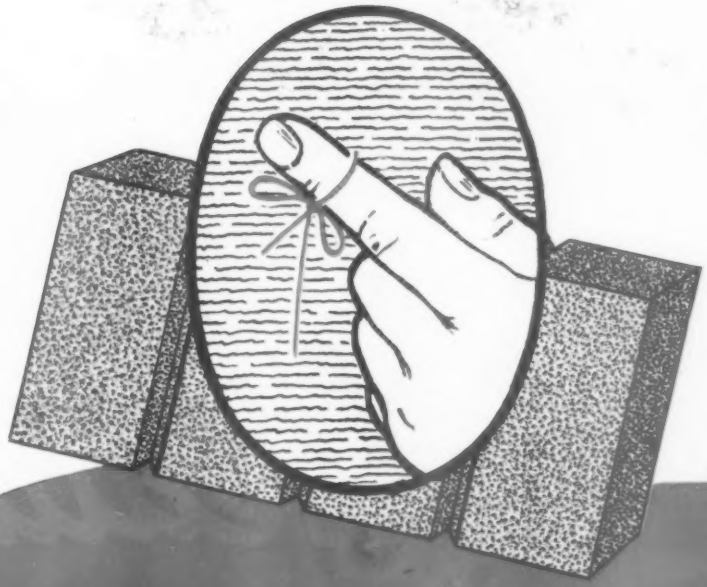
Raymond L. Collier, executive vice president of Gray Iron Founders' Society, addressed both of the new groups.

Book Review

ASTM Standards on Copper and Copper Alloys, paper, 504 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $4.35; cloth binding, $5.

This 1948 publication includes 106 standard specifications, test methods, definition of terms, etc., relating to copper and copper-base alloy products which were developed by Committee B-5 on Copper and Copper Alloys, and other ASTM technical committees. Sixteen specifications cover alloys for sand castings, and include bronze for turntables and movable bridges and for bearing and expansion plates of fixed bridges; composition brass or ounce metals; car and tender journal bearings; tin-bronze and leaded tin-bronze; leaded red brass, semi-red brass and yellow brass; aluminum bronze, and copper-base die castings.

Other specifications deal with wire and cable, plate strip and sheet, cartridge case cups, bullet jacket cups, condenser tube plates, bearing and expansion plates, firebox copper plates, rods, bars and shapes, copper pipes and brass pipes.



EVEN WITH A STRING ON YOUR FINGER

You're bound to forget--

the small cost of using

Famous CORNELL CUPOLA FLUX *—when you see the great improvement in your castings -- and reduction in make-overs.*

Write for **BULLETIN 46-B**

FAMOUS CORNELL CUPOLA FLUX is a proven metal cleanser, used constantly in leading foundries. It not only purges molten metal of impurities but makes it hotter, more fluid and GREATLY REDUCES SULPHUR. Castings come sounder, cleaner. Chilled sides, hollow centers and hard spots are reduced amazingly. Machining is easier.

IT KEEPS CUPOLAS CLEANER. Bridging over is reduced to a great extent. Drops are cleaner. Time and labor is saved in maintenance.

MALLEABLE FOUNDRIES, with cupola operation, are showing a rapid trend towards the use of Famous Cornell Cupola Flux. Reports of greatly improved casting production come from every direction. Furthermore, there is a considerable reduction in cupola maintenance labor and cost. The life of cupola lining, whether brick or stone, is greatly prolonged.

SCORED BRICK FORM makes fluxing of molten iron but a matter of seconds. No digging out of container. No weighing. No measuring.

You simply toss Famous Cornell Flux into cupola with each ton charge of iron or break off one to three briquettes (quarter sections) for smaller charges. Flux in this form does not blow out with the blast but STAYS in melting zone until entirely consumed, insuring fullest efficiency.

The CLEVELAND FLUX *Company*

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

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Famous CORNELL ALUMINUM FLUX	*Famous* CORNELL BRASS FLUX	*Famous* CORNELL LADLE FLUX
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.	Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.	Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

VENTILATION COMPLICATES Foundry Heating

THE problem of "tempering" makeup air that replaces contaminated air removed from the foundry of Federal-Mogul Corp., Detroit, bronze bearing manufacturer, was solved this past winter by the installation of ten direct-fired space heaters.

To protect the health of its employees, Federal-Mogul uses considerable exhaust equipment in connection with operations that produce smoke, noxious fumes, dust and/or excessive heat. At peak, approximately 400,000 cu ft of air per minute is removed from the large foundry building by the various types of exhaust equipment. The foundry is 120 x 360 ft with an average roof height of 30 ft.

Because the volume of exhausted air exceeds that which can be brought into the building by infiltration through the doors and steel sash windows, a satisfactory method had to be devised to equalize the air pressure throughout the foundry. This would be relatively simple except that during the winter months, low-temperature replacement air would chill the foundry and cause uncomfortable working conditions. The object, therefore, was to install equipment that could bring in sufficient quantities of fresh, heated air to keep the atmosphere comfortably warm as well as healthful.

The ten heaters selected for installation to meet these problems were units developed and manufactured by Dravo Corp., Pittsburgh. The particular models used have an output capacity of 2,000,000 Btu per hour each, and operate with air taken entirely from the outside.

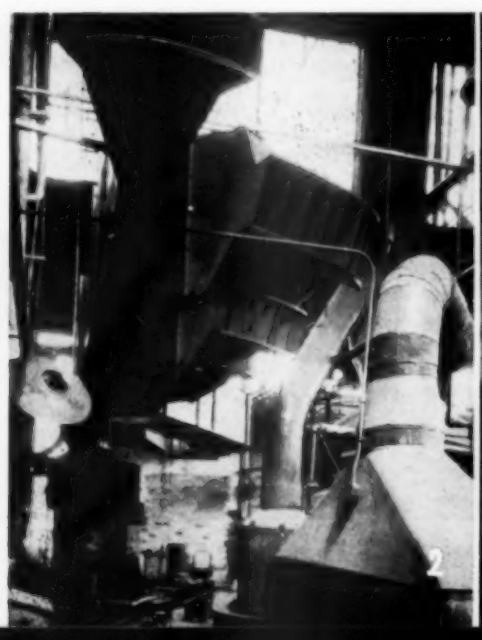
Basically, the principle involved is to take a large volume of air—these heaters are capable of handling 22,000 cu ft of air per minute each—raising its temperature and throwing it out into plant areas. The velocity

(*Continued on page* 228)

Fig. 1—Shed at left houses two of the ten heaters supplying warmed fresh air to replace exhausted air at foundry of Federal-Mogul Corp., Detroit

Fig. 2—These overhead ducts run from heaters in the outside shed

Fig. 3—Large duct, upper left, has capacity of 22,000 cfm of tempered air



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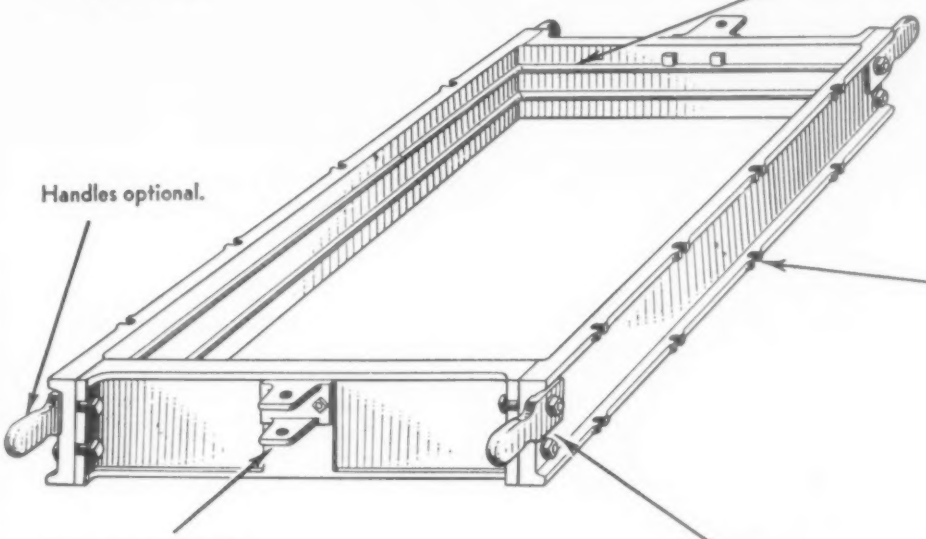
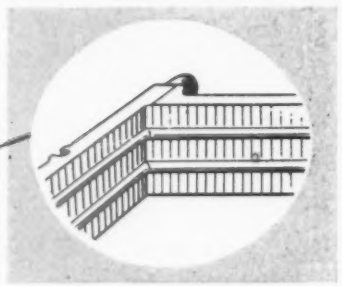
- **Interchangeable sides and ends earn more for you because they can be assembled into numerous combinations of flask sizes**
- **Store them disassembled on shelves and save valuable storage space**

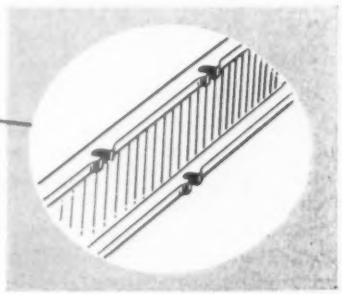


Handles optional.

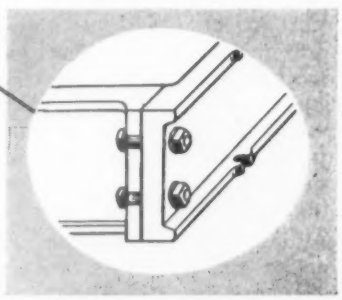
Ears optional. Pads machined to dimension.



Sand ribs inside ends and sides of copes and drags.



Flanges slotted to permit bolting copes and drags together using ⅜" bolts. Bottom flanges of copes, top flanges of drags, machined to make close joint.



End and side corner joints machined to dimension.

All Aluminum . . . Save Storage

Ends and sides standard in dimension and fully interchangeable. Any piece may be used for either cope, drag, cheek or upset.

Ends increase in length by 2-inch multiples, sides by 4-inch multiples. Height of ends and sides, 3, 4, 6 and 7 inches.

The many combinations of one size side or end with another keeps a greater percentage of your flask investment working, thus netting a larger return per dollar of investment.

Easy to assemble or disassemble using a common wrench.

Flasks are shipped knocked down, in bundles, saving greatly on shipping space and transportation cost. Delivery . . . PROMPT!

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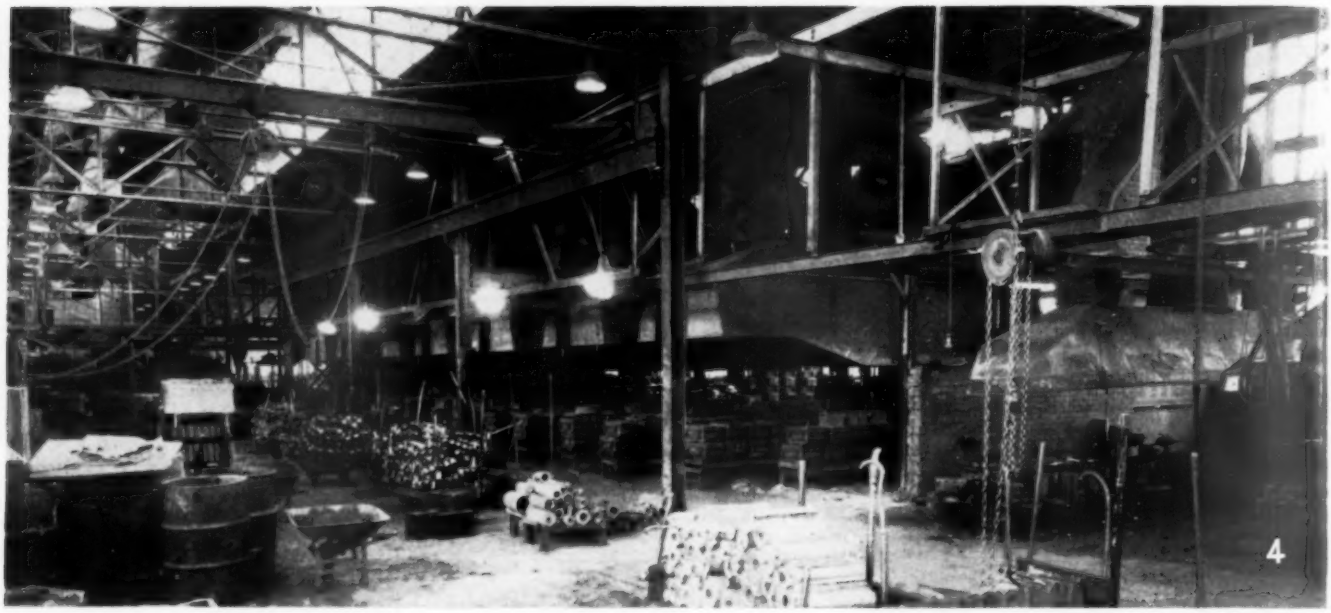


Fig. 4—Permanent mold and sand casting departments are well hooded. Exhausted air is replaced by fresh air discharged from outlets shown in upper left

(*Continued from page* 226)

of discharge is approximately 2000 fpm, which enables each heater to "cover" effectively an area of considerable size. In this method, uniform temperature can be produced without annoying drafts because the air is discharged horizontally, above the workers' heads.

Fresh air drawn into the base of each heater in this application passes first over staggered banks of economizer tubes which carry the exhaust from the combustion chamber to the vent stack. The tubes have inside swirlers that cause the gases to sweep the entire surface of the inside walls of the tubes. With this arrangement, the air sweeping the tubes cools the gases and picks up some of the heat value that remains after combustion.

Following the pass over the economizer tubes, the air stream flows over the stainless steel combustion chamber. Because of its heat resisting qualities, stainless steel prolongs the life of the heaters and provides sustained efficiency. The differential between operating and oxidizing temperatures is three times greater using stainless steel than when ordinary carbon steels are employed.

After sweeping the combustion chamber walls, the air then is discharged into the plant through overhead nozzles that can be rotated to direct the flow. Some of the heaters discharge into ducts.

Four of the heaters are located outside the building in specially built metal sheds. Discharge ducts extending through the wall from the heaters carry the warm air into the foundry and to areas where it is needed. Four additional heaters are floor-mounted in the foundry along the interior walls, with their intake ducts extending through the adjacent windows. The other two heaters, because of limited floor space available, were mounted in a horizontal position on overhead steel platforms. It was possible to install the heaters in this unusual position because their stainless steel combustion chambers do not require a refractory lining which tends to become dislodged when such units are placed sideways or upside down.

Supply Tempered Air

Heaters No. 1 and 2, in one metal shed at the southeast corner of the foundry, discharge tempered air through ducts to strategic locations across the 120-ft width of the building. Various melting furnaces and mold pouring stands are situated in this area. Each furnace is equipped with a hood to carry off fumes. Moreover, considerable quantities of air are used for combustion in the furnaces and this accounts for additional loss of air.

Heater No. 3 is a horizontal unit mounted on a steel platform about 12 ft above the floor in the rough grinding and inspection department. Each of seven grinders here is connected to exhausters to remove generated dust.

Heater No. 4 is an upright unit that throws makeup air into the shot blasting department where three large rotary shot blast machines are located. No. 5 heater is a platform-mounted horizontal unit along the west wall and supplies fresh air for that part of the molding department running parallel with the west wall. It discharges toward the north end of the building.

Heaters Nos. 6 and 7 are positioned upright on the floor along the east wall in the melting department to replenish the air exhausted through hoods over five large melting furnaces, a cupola furnace and two ladle preheaters. Heaters Nos. 8 and 9 are in a metal shed outside the east wall. The entire output of one of these heaters is discharged directly into the core oven area. The discharge from the second is taken by ducts to the sand molding and shakeout department where exhaust hoods cover extensive areas to remove smoke, heat and fumes.

Heater No. 10 is placed in the northwest corner of the building, discharging into an area occupied by five hooded melting pots, one smelter, several die casting stands and two enclosed skimming stations.

To coincide with the existing piping systems in Federal Mogul's foundry, thereby minimizing the amount of alteration required, five of the units are arranged for firing either with fuel oil or gas. Each can be changed from one fuel to the other in five to ten minutes. All of the heaters have special automatic modulating controls to keep the temperature of makeup air constant and uniform. The burner of each heater is regulated by a ductstat in the discharge

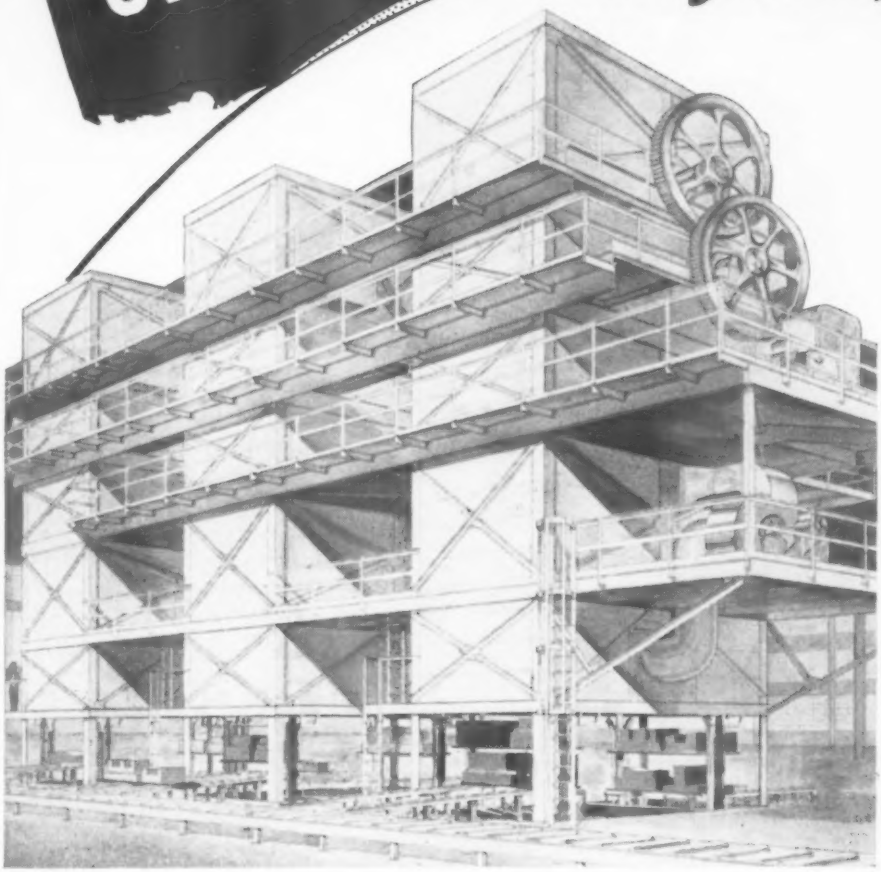
(*Concluded on page* 230)

Outstanding Vertical Oven Installation

made for Large Steel Castings Co.

by

CARL-MAYER



Dimensions (each oven)—67'0" top to bottom x 11'2" x 20'0" cross section.

Load per carrier—5 tons.

Load per oven—80 tons per bake, maximum.

Gas Fired Recirculating Heater Principle; fully automatic.

Semi-automatic loading; automatic unloading.

●

CARL-MAYER PATENTED (pat. no. 2,257,180) **RECIRCULATING HEATING SYSTEM,** obtainable only in Carl-Mayer Ovens, assures unusually fast and uniform baking with amazing fuel economy.

CARL-MAYER DESIGN also keeps working conditions comfortable because heat and fumes are removed from the cores before they reach the unloading zone.

CARL-MAYER CONSTRUCTION is unusually rugged—keeps maintenance low.

WRITE FOR BULLETIN showing the extensive line of Carl-Mayer Core and Mold Ovens.

OTHER CARL-MAYER VERTICAL OVEN INSTALLATIONS FOR CONCERNS SUCH AS—

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CORE AND MOLD OVENS

AN 1100-LB. KISS!

. . . R & M heavy hoist has a light touch

Gently an 1100-lb. weight is lowered until it touches the light bulb. Control of the R & M Hoist is so easy, so precise, the bulb is not damaged. That's the kind of control needed in setting and drawing out cores, closing and lifting off molds.

R & M 2-speed Hoists are efficient in every phase of casting. Steady, 3-feet-a-minute speed and instantaneous response to controls are an ideal combination. For long hauls and quick lifts the 20 feet-a-minute speed saves time, frees specialized labor for more profitable tasks. Compact design has double advantage of sturdier construction and low headroom for low-ceiling work. R & M Hoists operate from fixed mountings, jibs or straight and curved I-beam track. Types to travel manually, or under their own power, according to the job. Your plant engineer can install.

In the foundry installation above, three R & M hoists have been in daily use for 18 years, 24-hours a day during the war. Only one minor repair job since the system was installed.

In your plant are places R & M Hoists can pay for themselves. Let our sales-engineers make recommendations. Write for information on R & M Hoists in capacities from 250 lbs. to 20,000 lbs.

ROBBINS & MYERS · INC.

· HOIST & CRANE DIVISION ·

SPRINGFIELD 91, OHIO · BRANTFORD, ONTARIO

MOTORS · FANS · MOYNO PUMPS · FOUNDED 1878

(*Concluded from page* 228)

air stream so that air will remain at approximately 85° F, regardless of outdoor temperature. This assures comfortable working conditions since the demand on the several small overhead steam unit heaters used for space heating throughout the plant is not as great when the makeup air has been tempered.

In the summer, the burners in the Dravo equipment are shut off and the heater fans bring in fresh, unheated air for ventilating the foundry. These fans, located in the base of each heater, are mounted on a single shaft and are powered by a 20-hp electric motor.

The stainless steel combustion chamber in each heater achieves rapid transfer of heat from the flame to air and permits a complete shutdown of the equipment during non-working hours without risking delay in delivery of heat after restarting. Maintenance of the equipment is negligible.

Bringing fresh air into the foundry in this manner increases the efficiency of exhaust equipment because atmospheric pressure in the structure remains equalized. Exhausting lead fumes, for example, is difficult in negative pressure because these fumes are heavier than air. Suction fans therefore would pull out more air than fumes.

ANTIOCH PROCESS OF METAL CASTING

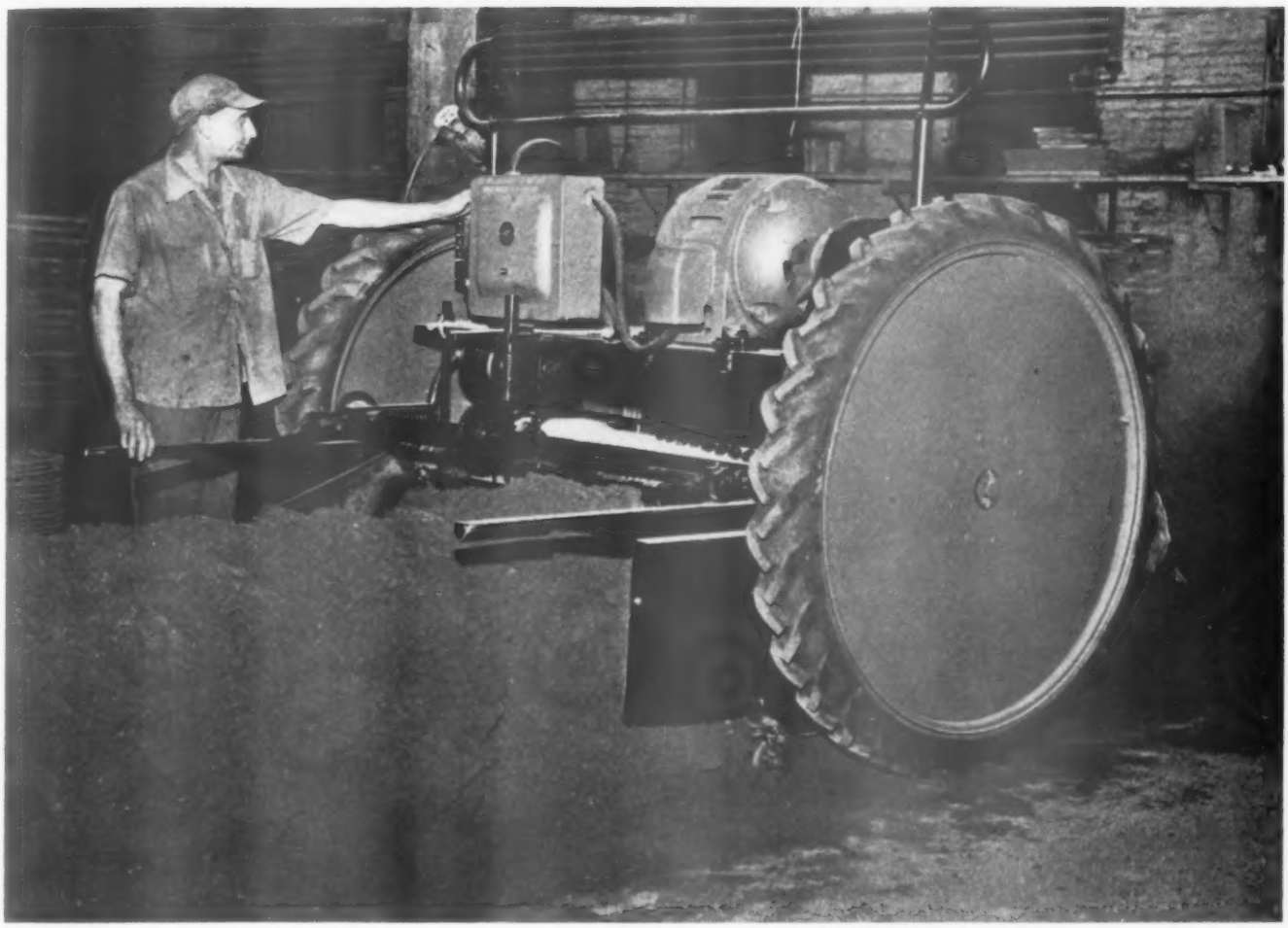
(*Continued from page* 77)

ready to receive molten aluminum to form castings. The complete cycle of operation will average 40 hours. That is a long time, I'll admit, bringing up serious criticism of economy. However, in this case there is a wide open opportunity for metallurgists and process engineers to develop improvements.

During the curing period much of the water which was added to the plaster to form the wet mix, and which brings about the hardening action, is driven off. The amount evaporated is limited so as to reconvert the gypsum to a semihydrate condition. However, the autoclave treatment accomplishes a physical change in the internal crystalline structure, bringing about a condition of considerable permeability and reduced dry strength. The Antioch process is unique in obtaining this change in structure. The permeability is essential to permit entrapped air and gas to escape during the periods of metal pouring and solidi-

(*Continued on page* 232)

The New Moulders' Friend
FINDS FRIENDS EVERYWHERE



Moulders like The New Moulders' Friend, because the blending action of the rotary wire brush thoroughly mixes and aereates the sand, making it easy for them to put up more and better moulds.

Night crews like it, because it eliminates much manual labor and does a better job of conditioning the sand.

Sand control men like it, because it does such a thorough job of mixing that they really can control the sand.

Maintenance men like it, because it has few moving parts to keep in order.

Men who buy castings like it, because it gives them better castings with a smoother finish.

You will like The New Moulders' Friend, because it will decrease your scrap and labor costs and will improve the morale of the men in your foundry.

Begin a profitable friendship with The New Moulders' Friend by writing for further particulars.

"The Moulders' Friend"

Sand Conditioning Equipment
Dallas City, Illinois

WEBB Foundry Conveyors Are "Built-In" to the Job...

. . . and are engineered, fabricated and installed by a competent and thoroughly experienced organization.

The illustration shows a typical Webb foundry installation. Molds are carried on an overhead conveyor system to the pouring station; a slat conveyor at proper pouring level travels at the same speed, providing a stable pouring platform. This is just one of the many effective conveyor combinations that can be used to cut foundry operating costs.

5237

Our representatives will be glad to call on you to make specific recommendations for your requirements.

WEBB

JERVIS B. WEBB COMPANY
Conveyor Engineers and Manufacturers
8951 ALPINE AVENUE • DETROIT 4, MICHIGAN
Offices in Principal Cities

(Continued from page 230)

fication.

As indicated by some of the accompanying illustrations, mold shapes of desired contour and section may be realized by using plaster, whereas they would be more difficult and impractical to be made in sand. Other advantages are inherent in the use of plaster. Probably the most important is the fact that it can be made to vary in thermal capacity from an excellent insulator to a mild chill. Aluminum prefers plaster as an envelope and will assume much thinner sound sections in plaster than found possible in sand. Likewise, the surface finish so obtained is far superior to that produced by any other material.

The impressions exploded upon us in our first exposure to the Antioch process were considerable. Here was a release from at least some of the pagan gods of authority. Here was an opportunity to make a new approach to foundry processing, with new people unhindered and unhandicapped by the inertia, customs, and traditions of old time craftsmen.

Process Limited in Economy

Admittedly, under present specifications the Antioch process is limited in economy. For that reason, its use in production applies only to complicated design parts that cannot be made more economically by other means. However, from the experimental aspect the process has served to stimulate great improvements in quality and dimensional standards of normal foundry castings. Considerable credit may be gleaned for the progress achieved with Allison engine castings. Further, the people engaged in that work have the satisfaction of knowing that the first aluminum castings which satisfied the Allison aircraft engine endurance test were produced by the Antioch process.

The work pioneered by Mr. and Mrs. Bean has grown into a considerable portion of our Bedford production output. We have been fortunate in applying the process as a means to produce hydraulic transmission torque converter elements of the type known as the Dynaflow. Recently when speaking to an engineering group we stated that we are proud of the converter castings, not because they represent the solution to a difficult technical problem, but rather because of what they represent in the mental attitude of our Bedford personnel. They are a fair proof that we are attempting to get rid of the pagan gods of authority.

Again, however, and speaking

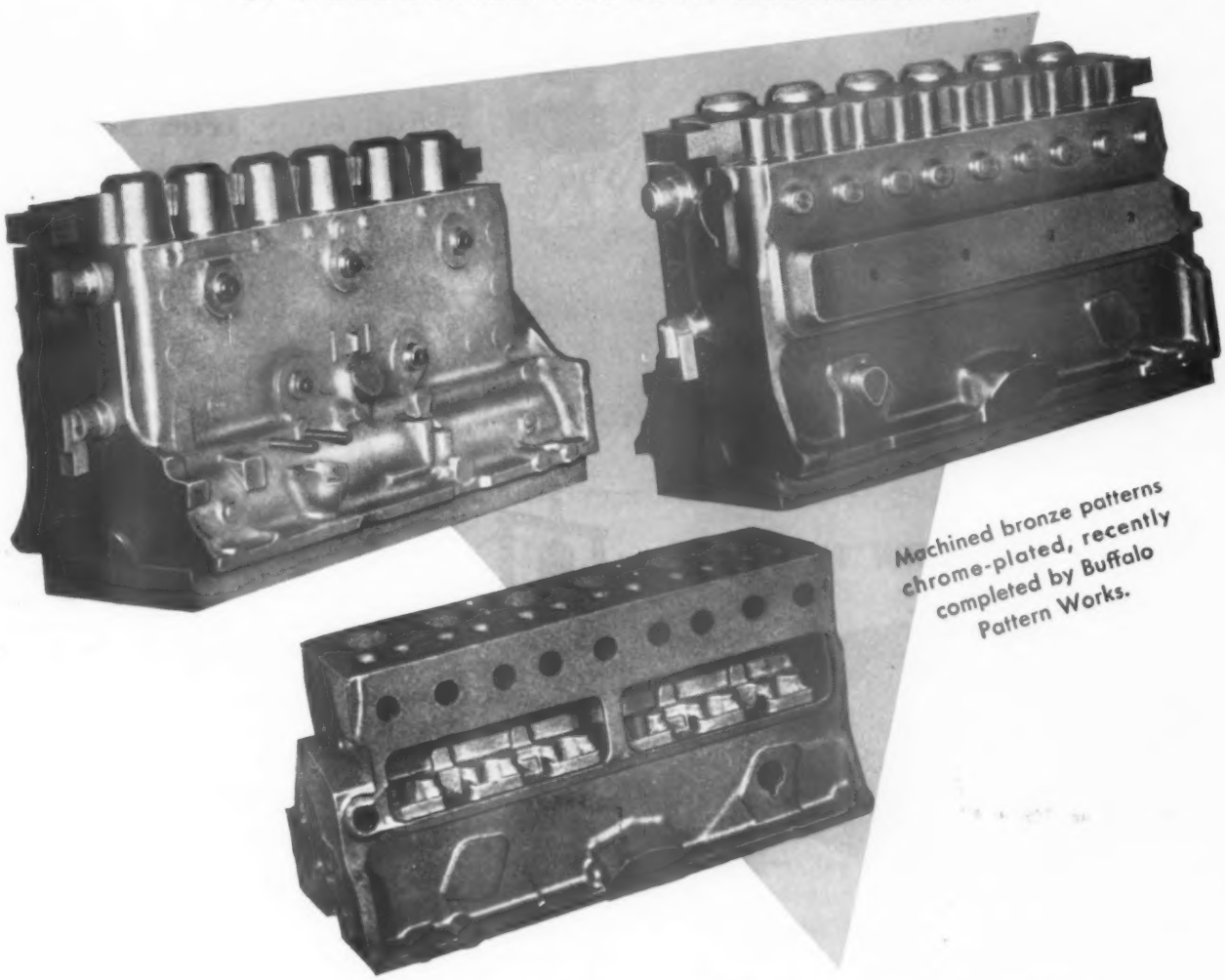
(Concluded on page 234)

BUFFALO PATTERN WORKS

1893 1949

56 Years

OF PRODUCTION PATTERN ENGINEERING



Machined bronze patterns chrome-plated, recently completed by Buffalo Pattern Works.

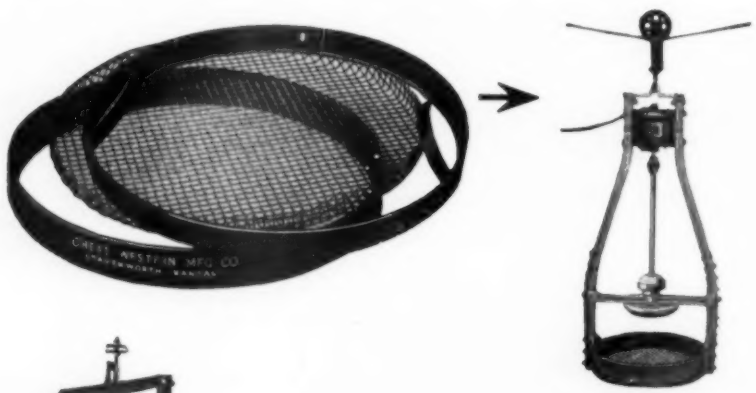
Metal Production Pattern Equipment • Core Gages • Duplicator Models
Blow Core Box Rigging • Wood, Plaster and Experimental Patterns
We invite you to consult us on your pattern engineering problems.

BUFFALO PATTERN WORKS

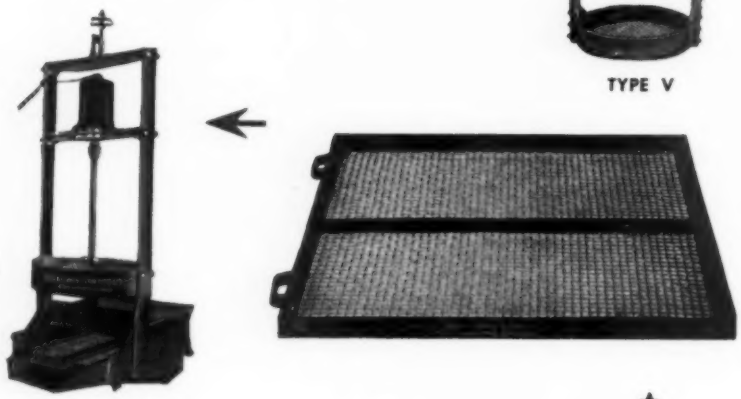
830 HERTEL AVE. . BUFFALO, N. Y. RI. 3512

How Are You Fixed for Extra Screens?

Combs sieve bottoms are made of very heavy galvanized wire in numerous gauges and mesh. Quantity discounts apply . . . it pays in many ways to order extra screens for your Combs units. Ask your foundry supply house.

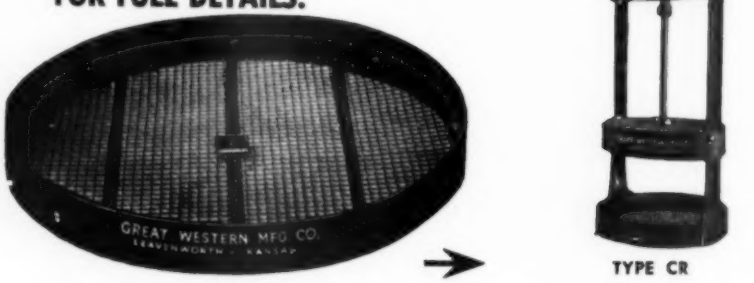


TYPE V



TYPE CS

WRITE FOR BULLETIN "F" FOR FULL DETAILS.



TYPE CR

MESH	W & M GAUGE WIRE	LIST PRICES V	CR	CS	V-S
2	14	$1.50	$2.00	$2.50	$4.50
3	16	1.50	2.00	2.50	4.50
3½	18	1.50	2.00	2.50	4.50
4	18	1.50	2.00	2.50	4.50
5	20	$1.50	$2.00	$2.50	$4.50
6	20	1.50	2.00	2.50	4.50
8	20	1.50	2.00	2.50	5.50

Discounts 1 to 5—Net, 6 to 23—5%, 24 or more—10% } Can be mixed meshes but for same type machine.

Steel Rims Type V $4.00 set; Types CR-CS 5.50 set; Type V-S 16.00 set

Great Western Manufacturing Company

LEAVENWORTH, KANSAS

(*Concluded from page 232*)

seriously, may I repeat we are conscious of the economic limitations of the process and are constantly striving for improvement. In that connection experiments are being carried on with synthetic resin binders, curing by means of the short-cycle dielectric machine. The method is simple and practical but lacks a complete solution for want of satisfactory drier forms. Other experiments are being carried on which may in the future displace some, if not all, phases of the Antioch production process. The possibilities are startling. There are great opportunities before us. The next few years, at the outside, ten years, I believe will see a revolution in foundry methods, whereby we hope to do our share in General Motors to make more and better things for more people.

Gray Iron Society Reports on Wages

Gray Iron Founders' Society, National City Bank Bldg., Cleveland, has issued "Wage Rate Report for the Gray Iron Foundry Industry—July 1948," which includes summaries of wage rates, both average straight time and incentive earnings rates, for 52 local regions throughout the United States. Average hourly earnings, compiled from information received from more than 500 gray iron foundries are shown for 51 selected occupations in the industry. In addition to the area wage rate summaries for the 52 regions, the report gives important data on operations and hours of work. Copies of the report are available for purchase by gray iron foundries at $15 per copy, postage prepaid, from the society.

Foundry Is Cited For Safety Record

Two departments of the Commonwealth Plant, General Steel Castings Corp., Granite City, Ill., recently were cited by the American Mutual Liability Insurance Co., Boston, for having completed 250,000 man-hours without a lost-time accident for 12 consecutive months.

Certificate awards for safety were presented by William L. Shank, works manager of the Commonwealth Plant, to his general foremen and safety committee chairmen—Ray Sheriff and Eldon Cook of the sand system department, and Frank Pierron and Leo Sunder of the metal form department.

"I need sulpha..."

"I need penicillin..."

"I need quinine..."

. . . . . and

DIFFERENT FOUNDRY JOBS need *Different Bonding Clays too!*

"I need ephedrine..."

"I need streptomycin..."

Another year has begun . . . We repeat our 25-year-old warning:

Different foundry jobs demand different bonding clays, because no one clay can do all jobs equally well.

You can't escape that fact. The requirements for hot strength, dry strength, permeability, flowability and other properties vary "all over the lot". ECP satisfies these conditions with, not one or two or three, but with *five* distinctly different bonding clays. Each has its own characteristics. Each does certain jobs best.

Here they are: Dixie Bond, Black Hills Bentonite, Revivo, Revivo Super Bond, Balanced Revivo — plus a "whole flock" of combinations. Thus equipped, ECP sales engineers can and do recommend the one right answer to your need. Thus you get most bonding strength for every dollar you spend.

* * *

Ask for our 24-page, well illustrated bulletin describing ECP's modern and unusually complete facilities.

EASTERN CLAY PRODUCTS, INC.

Jackson, Ohio

GET ALL FOUR *with* HYDRO-BLAST

CLEAN CASTINGS CLEAN SAND CLEAN AIR

...*and* A GOOD, CLEAN PROFIT

- **clean castings**

  This is the primary function of Hydro-Blast—to clean castings. It does so, exceedingly well; does it efficiently, quickly; speeding production and cutting cleaning costs, achieving handsome savings that can quickly repay the whole cost of installation.

- **clean sand**

  The washing action of Hydro-Blast *cleans sand*—always improves it, and in a great many instances makes it *good as new*.

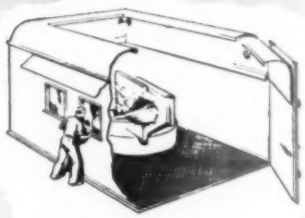
  Most Hydro-Blast users report substantial savings in sand cost as an added factor in quickly paying for the Hydro-Blast.

- **clean air**

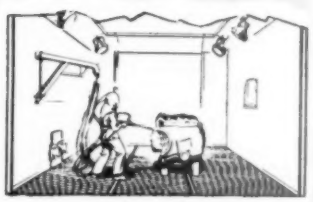
  Here is a vital by-product of extraordinary value: within half an hour after Hydro-Blast operation is begun, the dust concentration in the air within 50 feet of the Hydro-Blast is lessened by 50 percent.

- **and a good, clean profit**

  You can get all four. How to get them is worth investigating—still more richly worth enjoying. There's a simple way to start—ask us.

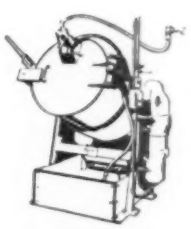


OPERATOR OUTSIDE—for cleaning heavy deeply cored castings by means of high capacity equipment, mechanically mounted.



OPERATOR INSIDE—an efficient low cost method of cleaning deeply cored castings; for production and custom foundries.

HYDRO-BLAST CABINET—excellent for cleaning small, intricately cored castings requiring special attention.



HYDRO-BLAST BARREL—a wet tumbling process, highly effective and economical for cleaning many small castings.

FOREIGN REPRESENTATIVES

ENGLAND—Pneulec Limited, Licensee, Smethwick (near Birmingham) England
FRANCE AND SWITZERLAND—R. Dureuil, 4 Square Du Graisivaudan, Paris 17, France
FINLAND—Pneulec Limited, Licensee, Smethwick (near Birmingham) England
BELGIUM—Charles Monseur, 195 Rue Saint Leonard, Liege, Belgium
NORWAY, SWEDEN, DENMARK—Pneulec Limited, Licensee, Smethwick (near Birmingham) England

HYDRO-BLAST

Chicago 47, Illinois

2550 NORTH WESTERN AVENUE

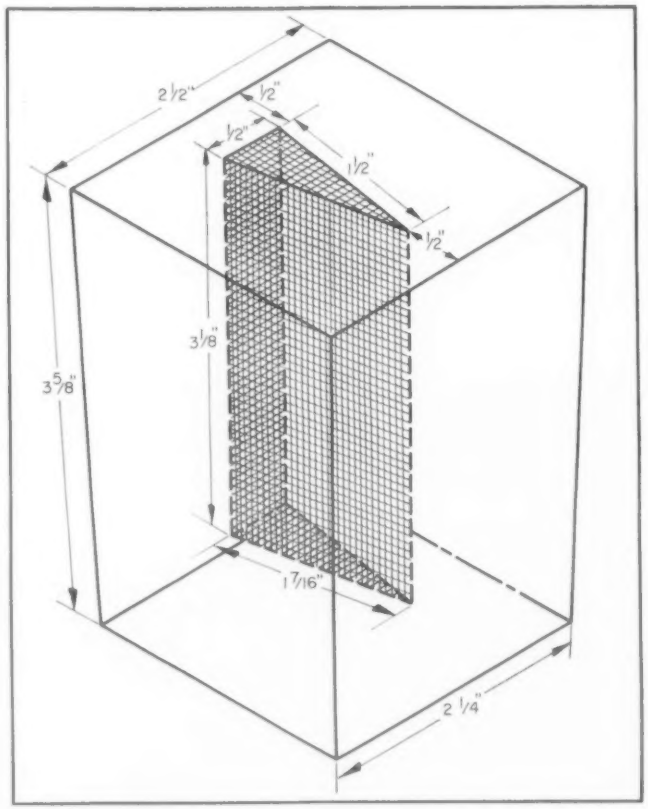
STANDARD PRACTICE INSTRUCTIONS
MELTING DEPARTMENT—CUPOLA (CHARGING)

1. Use only light-sectioned kindling for igniting cupola bed and use enough to insure thorough ignition of the bed coke. Kindling should not be over 1-in. in thickness.
2. Kindling to be ignited in alternate tuyeres to insure uniform burn-through of the bed coke. All tuyere covers to be open on light up of cupola.
3. ..... lb of large coke to be on kindling when cupola is lighted up.
4. USE ONLY LARGE HAND-PICKED COKE FOR THE ENTIRE CUPOLA BED.
5. 45 minutes after light up, add ..... lb of large coke to the bed.
6. Regulate evenness of burn-through by adjusting tuyere covers. If bed becomes red over entire surface close all but one tuyere cover.
7. 90 minutes after light up close all tuyere covers and fan cupola bed until entire surface of bed is white. Use ..... cfm (or lb) of air for fanning cupola bed.
8. As soon as cupola bed is white, shut off blower and open one tuyere cover.
9. Dress off cupola bed to a MEASURED ..... inches above the top of the tuyeres, still using only large coke. FINAL BED MUST BE LEVEL ACROSS ENTIRE CUPOLA AREA.
10. Add flux evenly across surface of bed and start charging.
11. No heavy scrap or pigged metal is to be used on fill of cupola. Use only light-sectioned returns and scrap on fill of cupola. If light material is not available, consult your foreman before starting to fill cupola.
12. Use only large coke for the first five coke splits.
13. Charges of both metal and coke must be spread evenly across entire area of cupola at all times.
14. Wind must not be put on at start of heat until cupola is full.
15. Cupola must be kept fully charged at all times until charging is completed.
16. Charging floor scales must be balanced at the start of each shift.
17. Be certain that charging carts are properly balanced before weighing materials into them.
18. ALL materials charged into cupola must be weighed and only the proper weights of each type of material are to be charged.

CONSULT YOUR FOREMAN BEFORE CHARGING ANY QUESTIONABLE MATERIALS INTO CUPOLAS.

From a discussion on "Controls in Cupola Operations" presented by Ford R. Snyder, Hickman, Williams & Co., Chicago, at a recent meeting of the Northeastern Ohio Chapter, AFS, Cleveland.

CONTROL CHILL CORE



As indicated, the chill test bar is made in a dry sand core, and is 1½ in. deep and 3⅛ in. high. Width at the back is ½-in. tapering to a feather edge.

CUPOLA OPERATING RECORD

Cupola No. ..... **Heat No.** ..... **Date** .....

Bed Height ..... **Weight Coke Fanned** ..... **Total Bed Coke Weight** .....

Cupola Light Up ..... **Bed Fanned** ..... **To** ..... **Volume** .....

Coke Splits .....

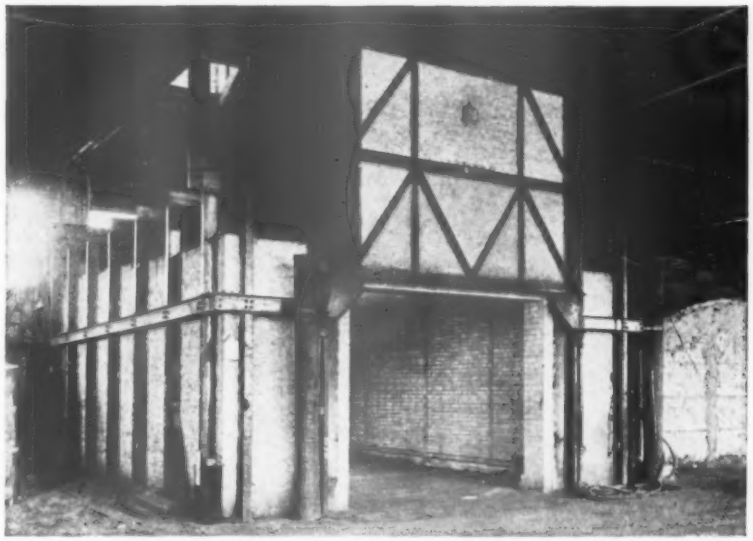
Flux Additions: **On Bed & Next** ..... **Charges:** .....

On Regular Coke Splits: .....

Remarks: .....

Time	Temperature		Windbox Pressure Ounces	Air Rate/Min.	No. of Charges
	Spout	Receiver			

I. F. B.* will *Reduce Your Annealing Costs*



A. P. Green Insulating Firebrick used in this 15' x 23' pulverized coal fired annealing furnace. LOWER FUEL COST—FASTER ANNEALING CYCLES—CLOSER TEMPERATURE CONTROL is obtained through the use of insulating firebrick regardless of the fuel used.

*A.P.Green** Insulating Firebrick

LOWER FUEL COSTS

Low heat conductivity and low heat capacity of A. P. Green Insulating Firebrick make them exceptionally well suited for use in malleable annealing furnaces. Because of these properties, heat loss through the furnace walls is considerably reduced. These heat-confining brick make it possible to reach "heat peak" with less fuel—resulting in a material SAVING for you.

FASTER ANNEALING CYCLE

A. P. Green Insulating Firebrick's high insulating and quick heating properties enable your annealing furnace to reach the required temperature in a shorter period of time. Result—faster annealing cycle—INCREASED PRODUCTION.

CLOSER TEMPERATURE CONTROL

The quality of your annealed castings is affected by the degree of control you have over furnace temperatures. A. P. Green Insulating Firebrick keep the heat where it belongs—less variation is encountered—you can be sure of consistent temperatures. Closer temperature regulation is possible.

This temperature control results in HIGHER QUALITY CASTINGS—FEWER rejected units—all of which means SAVINGS in time and materials.

SPECIAL SHAPES

Special sizes and intricate shapes made in I. F. B. quality can be furnished to meet your specifications. Shipments made promptly.

KAST-O-LITE . . .
Insulating Castable Refractory

Frequently, this "many-purpose" castable is used in conjunction with insulating firebrick in annealing furnace linings. KAST-O-LITE has essentially the same properties as A. P. Green Insulating Firebrick and is of particular value for flat suspended arches and under-floor insulation.

KAST-O-LITE is also used as a complete lining for many furnaces where a castable insulating refractory is preferred.

A. P. Green REFRACTORY PRODUCTS

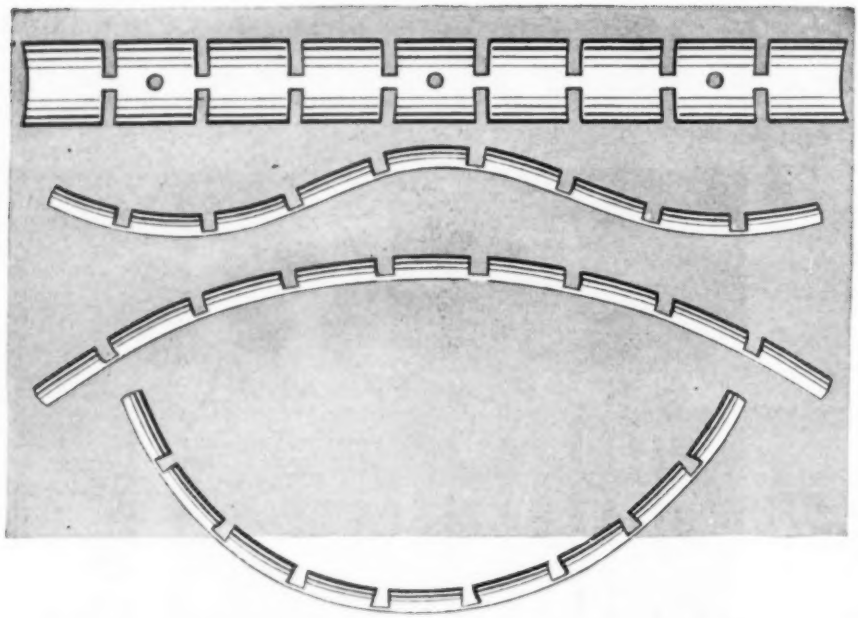
District sales offices and distributors with warehouse stocks in the principal cities of the world. In Canada, A. P. Green, Ltd., Toronto.

Write today for FREE Booklets giving full information on A. P. Green Insulating Firebrick and KAST-O-LITE insulating castable refractory.

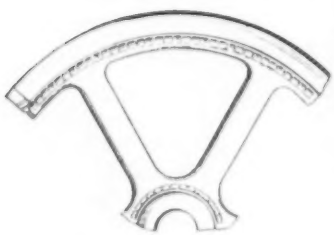
Address your inquiry to:

A. P. GREEN FIRE BRICK COMPANY
MEXICO, MISSOURI, U. S. A.

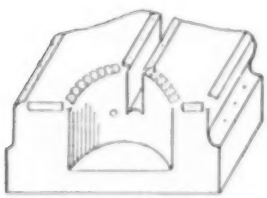
A. P. GREEN FIRE BRICK CO., Mexico, Mo., U. S. A.



Take the CURVES in HIGH with MILWAUKEE (PATENTED) Adjustable Radius Chills



Adjustable Radius Chills used to chill rim-and-web and hub-and-web fillets in a gear casting.



Adjustable Radius Chills in a semi-circular fillet, in 2 sections.

Curved or irregularly shaped fillets hold no fears for foundrymen who have learned how to use these easily adjustable, extremely flexible radius chills to gain one or more of these advantages:

- Quick, easy, hand shaping to fit single or compound curves along the fillets of cores or molds for cylindrical, round or irregularly shaped castings.
- Effective chilling of hub-and-web and rim-and-web fillets of gears and gear blanks.
- Eliminate buckling . . . because the rows of evenly spaced slots provide "room for expansion" when the hot metal contacts the chill.
- Adjustable Radius Chills are easily broken at 1" intervals to accommodate curved or irregular fillets of any length.
- They effect substantial savings in welding and cleaning costs.

Send for Samples and see for yourself that MILWAUKEE Adjustable Radius Chills can bring you these benefits, and more.

MILWAUKEE CHAPLET & MFG. CO.
1025 S. 40th STREET, MILWAUKEE 4, WISCONSIN

A 5355-2½

DETERMINING TIN IN COPPER-BASE ALLOYS

(*Continued from page* 87)

by the patented alloy "Stanreduce" sold by the Harshaw Chemical Co.

Further experience with the method has brought about enough improvements to warrant a revision of the procedure. One serious difficulty encountered was in the filtration of the precipitated hydroxides when the tin content was more than about 5 per cent. The process was slow and difficulty was encountered in washing out the copper complex. Another difficulty was that in some high tin, low lead alloys, results would sometimes be low.

Attempts to speed up the filtration by increasing the amount of ferric chloride were only partially successful. However, when a lead salt was added with the iron, filtration was rapid and no difficulty was encountered in the washing of the precipitate. The amount of KI added to the standard solution was augmented by a further addition to the solution before the titration. These and other changes give a method where the time to run a 10 per cent and a 1 per cent tin content is 20 minutes. The accompanying table shows the results obtainable by this method to be equal in accuracy to those obtained by umpire methods.

Solutions

Iron and Lead Perchlorate—To a 500-ml Erlenmeyer flask transfer 20 grams ferric chloride and 75 grams lead acetate. Add 50 ml perchloric acid, a few glass beads and heat over a Meker burner. Continue heating while swirling until all salts are in solution and perchloric acid refluxes down the walls of the flask. Cool somewhat, add water and warm to dissolve salts. Dilute to one liter with water.

Ammonium Hydroxide—3 per cent.

Dilute Hydrochloric Acid—In a 2-liter graduated cylinder dilute 750 ml hydrochloric acid to 2 liters.

Standard Potassium Iodate—Dissolve 2½ grams potassium iodate, 30 grams potassium iodide and 2 grams potassium hydroxide in water and dilute to 1 liter. The solution may be standardized either by running through samples of known tin content or against pure tin. For standardization with pure tin, dissolve exactly 1 gram tin in a 500-ml Erlenmeyer flask with 75 ml concentrated sulphuric acid and fume over a burner till the sulphuric refluxes down the walls of the flask.

(*Continued on page* 242)

DEVELOPMENT of THE CASTING INDUSTRY

By
Bruce L. Simpson

History of foundry practice, from days of prehistoric development of metal to modern castings production. The story of man's achievements, through his use of metal, which have contributed so essentially to modern civilization.

Illustrated

Clothbound 250 Pages

$7.50

Analysis of Casting Defects

To help foundrymen minimize and eliminate defective castings. Thirty-one basic casting defects listed and described. ..... *Price,* $2.75

An Introduction to Metallurgy

Second edition. By Prof. Jos. Newton. An elementary treatment of the subject, stressing principles rather than practices, and intended for classroom instruction. ..... *Price,* $5.50

Magnesium

By Pidgeon, Mathes, Woldman, Winkler and Loose. Discusses such topics as structural design, castings, corrosion and protection, and methods of fabrication. ..... *Price,* $3.50

Modern Blast Cleaning and Ventilation

By C. A. Reams. Casting cleaning methods presented and discussed in detail. Also abrasive selection and use. ..... *Price,* $4.00

Foundry Dust Control

Presents a wealth of authoritative information on foundry dust collecting equipment and systems. .. *Price,* $2.50

Alloy Cast Irons

Second edition. Thoroughly covers the subject in theory and actual foundry practices. ..... *Price,* $3.25

Centrifugal Castings

Provides a complete picture of this popular method of casting. .... *Price,* $3.00

Recommended Practices for the Sand Casting of Nonferrous Alloys

A new book, just off the presses that will prove invaluable to nonferrous foundrymen. ..... *Price,* $3.00

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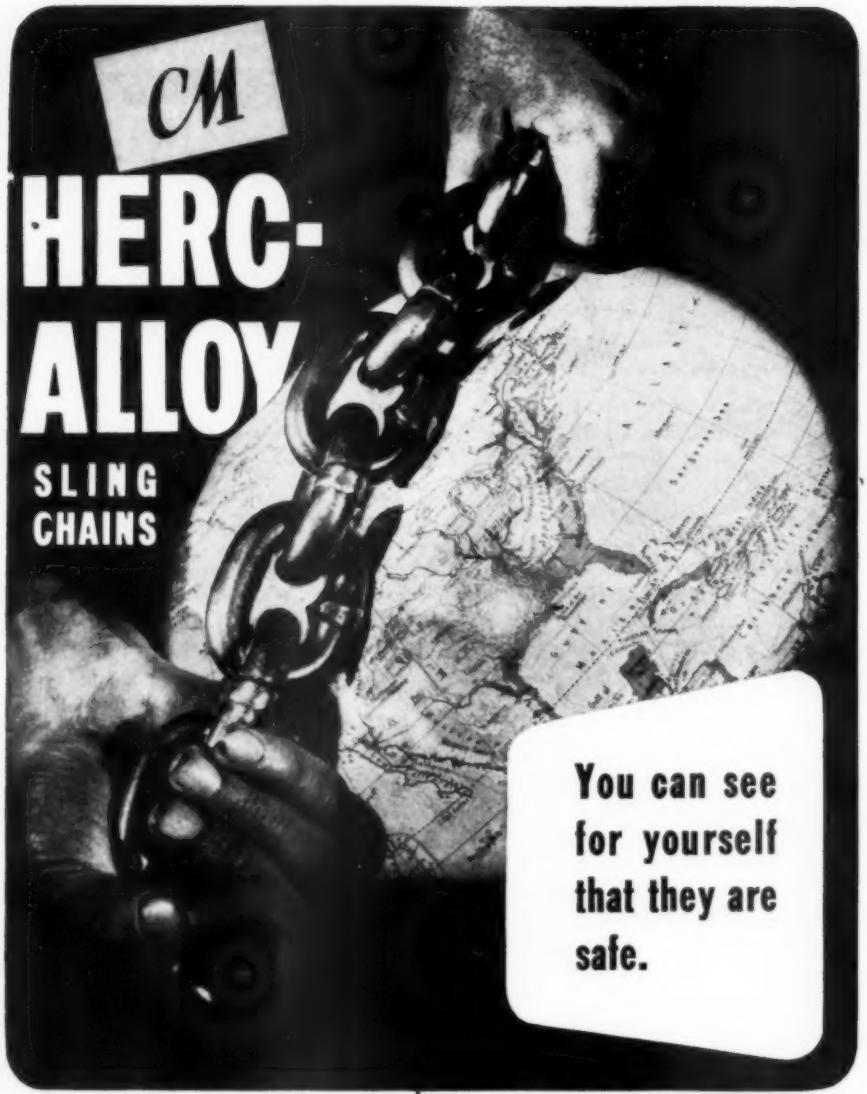

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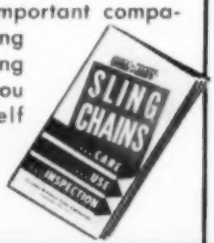

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GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
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(*Continued from page* 240)

Cool to room temperature and take up with about 100 ml water. Transfer to a 1000-ml volumetric flask and keep diluting while swirling. If hydrolysis of tin occurs, add more sulphuric. Cool to room temperature and dilute to the mark. Pipette out 50 ml, transfer to a 500 ml Erlenmeyer flask and add 125 ml dilute hydrochloric acid. Raise to a boil and complete as for brasses and bronze.

Starch Solution—Triturate 3 grams soluble starch with a little cold water and pour into 500 ml boiling water. Continue boiling until clear, cool and keep in a glass-stoppered bottle with about a milligram of thymol. If solution becomes cloudy, discard.

Sodium Bicarbonate Pills—20 grain double compressed.

Procedure—Transfer 1 gram borings to a 500-ml Erlenmeyer flask containing 5 ml iron and lead perchlorate solution. Add 15 ml hydrochloric acid and 15 ml 30 per cent hydrogen peroxide. Shake to mix and let stand until the violent action is over. Heat until the solution begins to boil. If any undissolved particles are visible, add a little more peroxide. Add about 25 ml pulp suspension made by breaking up 10 Whatman filter tablets with a little cold water, shaking to a slurry and diluting to 3 liters. The suspension cools the solution for the ammonium hydroxide addition and also facilitates later filtration.

Add 25 ml ammonium hydroxide, swirl to mix and raise to a boil over a burner. Let settle for about 15 seconds and filter through a 12½ cm rapid paper. Rinse out the flask with three small portions of hot 3 per cent ammonium hydroxide and wash the paper well three or four times, being sure to work up the precipitate each time. While washing the precipitate add 125 ml dilute hydrochloric acid to the flask and heat over a burner. Transfer the washed precipitate and paper to the flask, and swirl to dissolve the hydroxides. Raise to a boil.

(*Concluded on page* 244)

THE FOUNDRY Index Ready

The index to Volume 76 of THE FOUNDRY, listing by title, subject matter and author the editorial material published during 1948, is available for distribution. Subscribers may obtain copies on request.

12 o'clock
AND ALL'S WELL

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BROWN *Advanced Instrumentation* **FOR METAL WORKING**
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(*Concluded from page* 242)

Add about 10 grams Stanreduce and boil on a hot plate until all yellow color of ferric chloride is gone. Keep at a moderate boil for five minutes from the time the yellow has disappeared. Add a bicarbonate pill to the solution and cool in running water to below room temperature. During the cooling other pills are added to keep an atmosphere of carbon dioxide over the solution. Add about 0.2-gram potassium iodide, 5 ml starch solution and titrate to the starch blue end point.

Discussion—The danger of losing stannic chloride by volatilization in the dissolving and initial boiling period is negligible. Under the conditions of the determination, the walls of the flask furnish enough reflux action to prevent the loss. If desired a Kjeldhal trap inserted through a No. 6 stopper may be placed over the flask during the dissolving and initial boiling period.

The importance of throughly washing the NH_4OH precipitate cannot be overemphasized. Copper will normally be the chief interfering element. After washing, the apex of the paper in the funnel when viewed from the outside should show not more than a trace of blue. Tests were run on the amount of copper occluded in the precipitate after washing. On a 10.5 per cent tin alloy the maximum found was 0.005-gram which is well under the amount of copper that would interfere.

Saxter and Minto[2] state that the Stanreduce may be used over and over by washing with water, then with alcohol, drying and sifting out the fine powder. In this laboratory a failure of the method was traced to the reused Stanreduce which was cleaned by this method. Investigation brought out the fact that the best cleaning method for reuse is to accumulate the used powder in a 1500 or 2000 ml beaker. Wash with hot water and decant five or six times. The fine particles of paper from the pulp and the filter paper will have been washed out and also the finer particles of the alloy will have been decanted off. Wash twice with the dilute hydrochloric used for reduction and keep the powder always covered with this strength hydrochloric acid. For use a small wood or glass spoon is used to measure out about 10 grams of the wet powder. Always keep the powder covered with dilute acid so that no rusting should occur.

On running tin-free copper not more than one drop of potassium iodate should be used to produce a blue endpoint. For this reason no provisions for a blank are necessary.

During the titration the solution should not be shaken unnecessarily. In the case of a high tin where more than about 10 ml are used for the titration, too strong shaking might cause a slight re-reduction of the tin and thus yield slightly high results. The practice in this laboratory is to swirl the flask just fast enough to keep the blue disappearing as it is formed. Near the end point the potassium iodate is added dropwise with vigorous shaking to the first blue that does not disappear with further shaking.

In the literature there seems to be some disagreement on the stability of the potassium iodate solution and on the variability of the tin factor. Our experience has been that during the first two to three months there is a gradual but definite increase in the factor. For this reason the iodate solution is made up in 12-gallon jugs and aged prior to use. After aging there is a slight difference in factor between a low and a high titration. However, by using the same factor for a 1 per cent to a 10 per cent tin, the low tin would tend to be one to two hundredths of a per cent high.

References

1. M. Sherman, "Rapid Determination of Tin in Copper-Base Alloys," *Steel*, vol. 120, no. 20, May 19, 1947, p. 102.
2. E. T. Saxter and R. E. Minto, "Determination of Tin in Babbitts, White Metal Alloys, and Bronze," *Industrial & Engineering Chemistry*, Analytical Edition, vol. 15, no. 4, April, 1943, pp. 261-262.

VISITORS: Junior and senior students from the engineering college, University of Cincinnati, visited Hamilton Foundry & Machine Co., Hamilton, O., Nov. 3. The university is one of the Foundry Educational Foundation schools

MELTING COSTS

(*Continued from page* 79)

period, the melting rate can be accurately adjusted to meet these conditions.

Electric Furnace Batch Melting—To produce 60 tons of molten cast iron per day by the electric melting process, a 6-ton top-charge furnace would be a logical selection. Charges should be made up in the yard with a magnet crane. The investment in such a furnace for batch melting would be as follows:

1—6-ton top-charge electric furnace, complete with all electric equipment & controls	$81,000
2—Charging buckets	5,000
1—Yard crane plus 100 ft of runway	40,000
	$126,000

The annual depreciation cost on a 20-year basis is $6300, or 42 cents per ton on a 15,000-ton annual melt.

Estimated operating cost for a batch melting electric furnace is as follows:

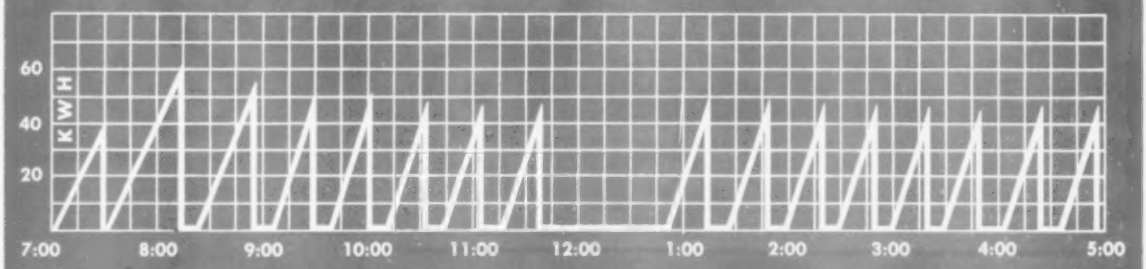
	Cost per Ton of Metal Melted
Power @ 1c per Kwhr—500 Kwhr per ton	$5.00
Electrodes @ 17c per lb—10 lb per ton	1.70
Operating Labor, 3 Turns	
3 helpers @ $350.00 per month	.84
3 helpers @ $1.50 per hr	.60
3 crane men @ $1.50 per hr	.60
Maintenance labor	.25
Refractory materials	1.00
Oil for heating ladles and preheating furnace lining	.10
Cooling water	.10
Depreciation	.42
Total (not including spread charges)	$10.61

Because the conversion cost per ton for electric furnace melting is approximately twice that for the cupola, the electric furnace must use a lower priced metallic charge if the cost of the metal at the spout is to equal that from the cupola. In some foundries, and especially those having a known and dependable source of cast iron borings, a considerably lower priced charge is possible. Some foundries are producing electric furnace cast iron at a cost lower than is possible for cupola operation under present conditions. Borings can be used to advantage in the cupola charge only if briquetted. The cost of briquetting is somewhat variable, but probably $2 per ton is a fair average figure.

A 6-ton electric furnace will melt 10 heats, or 60 tons of iron in 20 to

(*Concluded on page* 246)

DETROIT ROCKING ELECTRIC FURNACE



LFC—Brass

INSTALLATION—Three type LFC, 125 KW, 350 lb. nominal cold charge capacity Detroit Electric Furnaces in a Minnesota plumbing goods manufacturing company. Equipped with automatic rocking and electrode control.

OPERATION— Melt 350 lb. heats of 78% Cu, 13% Zn, 6½% Pb, 2½% Sn, and tapped into 400 lb. crucible. Operate 16 hours per day.

COSTS— 1947 Average Power 273 KWH/Ton—$3.53 • Electrodes, 410 lbs. bronze/lb. electrode—$ .66 Refractory, 5000 heats/lining—$ .72 • Melt loss, ¾% @ 17c/lb.—$2.60

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Equals BETTER QUALITY + LOWER COST

Detroit Rocking Electric Furnaces offer year-in, year-out high efficiency, uniform output, lowest possible metal shrinkage, plus constant and positive control of atmospheric conditions, accuracy of composition and speed of operation.

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On receipt of your production data, our engineers will furnish you with complete facts on the greater economy, constant and higher quality control, and faster output you achieve with Detroit Rocking Electric Furnaces which meet your most exacting requirements. Detroit Electric Furnaces for melting ferrous or non-ferrous metals are available in 10 to 4,000 lb. capacities, with conical or cylindrical melting chambers. For complete details, write today, to

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(*Concluded from page 244*)

22 hours, which necessitates 24-hour operation, probably on a three-shift basis, for the melting and pouring crew.

Batch melting operation spread over a 24-hour period, does not fit well with the conditions in most gray iron foundries. More floor space and more flask equipment is required and pouring costs are increased. Supervision cost also is increased. One of the largest automotive foundries in Michigan, which has an exceptionally well mechanized shop, will not consider 24-hour melting operation. The foundry manager says: "Every foundry needs a breathing spell to clean up the shop and cool the sand." Most foundrymen will agree with this opinion.

Cupola and Electric Furnace Duplexing — Duplexing equipment for a 60-ton per day foundry will include that discussed for cupola operation, plus a small electric furnace powered to superheat 8 to 10 tons of cupola metal per hour. The temperature increase desired will probably be about 400° F. The electric furnace thus serves as a superheating and mixing ladle. Its holding capacity should be about 2 tons.

The investment for duplexing equipment is made up of $67,600 for cupola, charging equipment and yard crane, and $36,000 for a 2-ton electric furnace, or a total of $103,600. Annual depreciation on a 20-year basis is $5180, or 34½ cents per ton on a 15,000-ton annual melt.

Estimated operating cost for duplexing practice is as follows:

	Cost per Ton Metal Melted
Cupola operation (no depreciation included)	$5.39
2-ton Electric furnace	
1 Melter @ $350 per month	.28
1 Helper @ $1.50 per hour	.20
Power @ 1c per Kwhr—50 Kwhr per ton	.50
Refractory cost	.75
Maintenance labor	.25
Cooling water	.10
Depreciation (cupola & electric furnace)	.12
Total (no spread charges included)	$7.59

Because the cupola is the prime melting unit, duplexing practice (unlike batch melting) cannot use a cheaper metallic charge than for straight cupola practice. Consequently, duplex operation will increase the cost of metal at the spout, over that for the cupola, by the amount required to operate the electric furnace.

All of the advantages of continuous pouring are provided by duplex melting, which also assures proper temperature to pour even very light-sectioned castings. The electric furnace provides a convenient place for alloying or making adjustments in composition.

Summary—For a foundry melting 15,000 tons annually, our comparison of the three methods of melting may be summarized as follows:

	Investment	Conversion Cost
Cupola	$ 67,600	$ 5.39
Batch melting—electric furnace	126,000	10.61
Duplexing with cupola and electric furnace	103,600	7.59

Investment figures include mechanical charging equipment. Conversion costs include depreciation but no other spread charges.

If good coke is obtainable, straight cupola melting practice is better adapted to the conditions in most gray iron foundries.

Under present conditions, with inferior and high priced coke, duplexing with cupola and electric furnace offers a practical solution for today's troubles. It provides proper temperature of metal with continuous melting and pouring.

Combined volume of shipments of ingot brass and bronze, as reported by the Ingot Brass & Bronze Industry, Chicago, was 21,731 tons for November, 21,559 tons for October and 21,666 tons for November, 1947.

A BETTER LONG STROKE BRINELL

For you folk who test large or awkward parts, singly or on a production basis.

The long stroke makes screw adjustment to work size unnecessary.

Large table eliminates extra help in handling. Table remains at a constant level and machine may be readily inserted in your conveyor line.

Straight Roller or Vee Roller table may be substituted for flat table shown.

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Available either direct reading, as shown, or as a plain Brinell in a size to accommodate your work. Motor to suit your current characteristics. Other types of standard machines also, in stock. Special machines built to requirements.

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Lanly builds all types of conventional ovens and special ovens and guarantees them to handle unusual or uncommonly difficult jobs.

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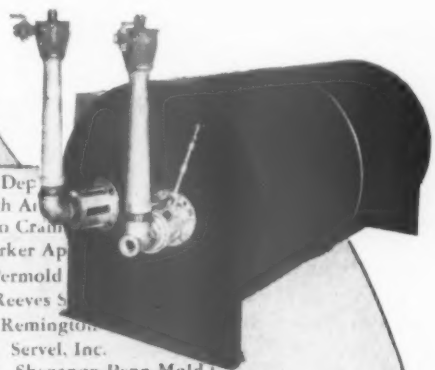

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OLD FOUNDRY Acquires the NEW LOOK

By ROBERT O. MAYER
Assistant Manager
Haven Malleable Castings Co.
Cincinnati

IT IS not often a company hears about one of its products that has been in service over 100 years. However, that happened recently to the Haven Malleable Castings Co., Cincinnati, as the company is now known. Originally founded in 1846 as the James L. Haven Co., the company produced school desk sides of gray iron and bells for various uses made of "steel composition iron." One of these bells recently was found and put into use again and the present owner wrote to the Haven Malleable Castings Co. giving a brief history of the bell.

A few organizations in the country brag nationally about their father-and-son combinations. The Haven Malleable Castings Co. not only can do that but in several instances the third generation is following the family traditon. The fathers and grandfathers can remember the days when chains, cider mills, and saddlery hardware were a large portion of the annual business. Elevators enjoyed quite a period of prosperity. These were not only manufactured in their entirety but also installed for the customers. Although the elevator business was discontinued in 1904, the company still receives occasional inquiries for repair parts. As these various departments were discontinued, they were sold to other companies rather than abandoned.

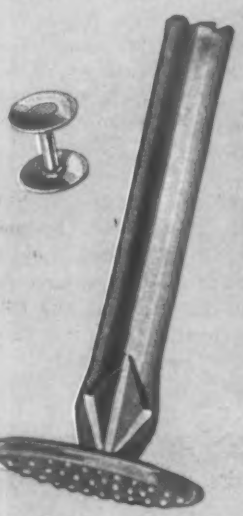
In 1900 the company moved to its present location. At least a dozen times the foundry has been flooded, but each time the company has resumed operations with a resignation

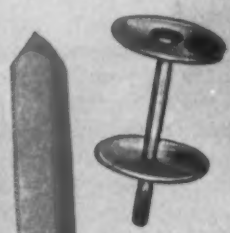
(*Continued on page* 250)

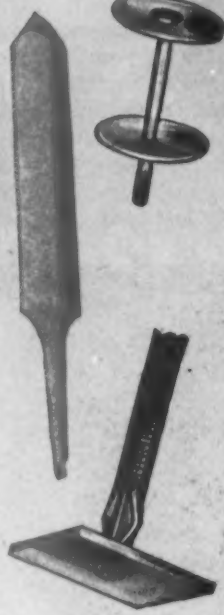
(Above)—Shop management and foremen of the Haven Malleable Casting Co., Cincinnati. *(Below left)*—View through foundry showing entrance to new locker room. *(Below right)*—Interior of new core oven

For Sound Castings

FANNER CHAPLETS & CHILLS







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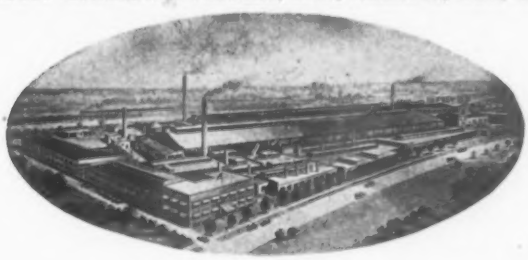

Birdseye view of the Fanner Brookside Park plant in Cleveland

The modernized pattern and flask storage area is orderly and well lighted

(*Continued from page* 248)

that the interruption was "all in a day's work." Within the last three years a flood control project by the city of Cincinnati has just about eliminated that hazard.

Three years ago a complete reorganization of the company was effected. Albert J. Sprong assumed the presidency, William S. Edgemon became secretary-treasurer, with Frederick W. Dixon behind the reins as vice president and general manager. Along with the reorganization an extensive modernization of the shop itself was started.

The program of modernization began with a relighting of the entire foundry, coreroom, pattern shop, and office. A concrete floor was laid in the foundry and for the first time in 40 years the molders could set their molds on an even keel. Next came the melting furnace. Two hand-charged, hand-fired furnaces were replaced by a modern 20-ton air furnace. This furnace has a monorail, traveling hoist located over it for charging and setting the bungs. An indoor coal storage was located near the pulverizer and blower for simplification of firing. With the installation of the new melting unit there has not been one late heat and the temperature of the iron tapped is always 2930 to 2950° F.

Following installation of the melting furnace, a natural sequence was to provide rapid disposition of molten iron to the pouring stations. A monorail system with the necessary switches now keeps 12 bull ladles on the go throughout the tap-out period. A double track end at the furnace spout permits one bull ladle to wait while the second ladle is being filled. It is a routine procedure to pour an 18 or 19 ton heat in 35 to 40 minutes without stopping off the stream. Incorporated in the monorail system are two side tracks where the bull ladles are preheated to 1600°F just prior to tap-out time.

Production control at the time of the reorganization was lacking. There were only 13 molders and scheduling of their patterns was haphazard. Scrap was not checked; it was just tossed back in the furnace the following day. The molders had to move their work from the previous day so they would have room for that day's work.

At present 42 molders are working every available portion of the floor area, with one or two spare molders on hand. This is good insurance because the melt foreman, at the time the furnace is charged, does not know

(*Continued on page* 252)

Enlarged coreroom eliminates bottleneck created by increased production

SHAKEOUT REDUCES LABOR 80%

FOR MIDWESTERN STEEL FOUNDRY; TWO MEN AND A MACHINE TAKE THE PLACE OF A CREW OF 12!

That's the type of information a foundryman likes to kick around while he considers a product. Something that reduces labor costs while promoting efficiency and production is really worth considering—and that's exactly what this new PORTABLE SHAKEOUT UNIT does. The machine pictured here is in operation on a squeezer floor. One man merely tips the flask from the roller conveyor onto the skip hoist. When the skip hoist is full, he pushes an electrical control and the hoist automatically rises to the discharge position, discharging the sand and castings on to the shake-out and returns to receive the next load. Sand lumps are broken up, and virtually all the cores are knocked out of the castings. But most important, this unit and two men do all the work formerly performed by a crew of 12 on full shift operation. By reducing labor costs 80%, the unit will pay for itself in labor savings in less than 6 months of service.

PRODUCTIVE EQUIPMENT CORP.

★

Write for additional information on the GYROSET "SKIP-N'-VEYOR" Portable Shakeout.

2926 W. LAKE STREET, CHICAGO 12, ILL.

(*Continued from page 250*)

whether all the molders will be in or not. Consequently, the quantity of iron charged is based on full molder capacity. Should one or two be off, the iron provided for them would be poured on the floor at the end of the heat. If a molder or two is available as a reserve, this loss is practically eliminated.

The payroll during the doldrum period totaled only 90 to 100; the number now on the payroll, exclusive of the office, is 175. Improved working conditions currently in effect and the piecework rates paid have resulted in attracting more men seeking foundry work.

Molding operations have been speeded up by supplanting old machines, all of which were hand operated, by modern jolt-squeeze units. A few of the old machines are left, being used for gated patterns which cannot be handled on the new power machines.

The pattern storage vault has been relighted and new storage racks built to accommodate the 1300 odd patterns on hand. Storage room also is provided for the 190 flasks used only intermittently. This quantity of flasks may seem abnormal to some foundrymen, but it reflects a situation faced by the jobbing shop when customers just "send their patterns in" without consulting the foundry pattern shop before making gates or matchplates. Such consultation could help to standardize flask sizes to some extent.

As the foundry became modernized and production increased, the coreroom became a bottleneck. In correcting this situation the old coke-fired 6 x 8-ft oven was torn out and a new 12 x 17-ft oven was built outdoors to conserve floor space. The new gas-fired core oven will handle a day's production of 3500 lb in two hours. Relocation of the workers' shower and locker room provided space to double core storage space, and utilization of portable oven racks, strategically spaced in the coreroom, has saved steps for the coremaker and increased production. The altered coreroom layout also has permitted introduction of piecework, which was impossible under previous working conditions.

Castings Are Inspected Twice

Castings are cleaned and inspected both before and after the anneal. Cleaning and sorting in the hard iron condition makes it possible to obtain a daily check on the scrap and nature of the molding defects, as well as to determine actual daily production and make proper allowances for the molders' pay. Most castings do not require grinding; those that do are usually ground before annealing, although some are necessarily ground after the anneal.

The former method of cleaning castings was superseded with installation of two airless blast barrels. One machine is used for all the hard iron cleaning. This cleaning is just enough to assist the inspectors to find defecting castings. A smaller unit is used for soft iron cleaning after the castings have been inspected following the anneal.

As yet a press for straightening and coining has not been installed, and the only type of straightening we are able to do is what may be done by hand.

Conversion of the four annealing ovens from hand-fired coal to oil was required not only from the production standpoint but was forced by enactment of a local anti-smoke ordinance. This ordinance prohibits use of high-volatile coal, and it was found that smokeless coal would not produce the desired oven tempera-

(*Concluded on page 254*)

Sawed Two Sides Machine-Cut Cupola Blocks 12" x 6" x 6"
THESE CUPOLA BLOCKS AND LINERS ARE STRONGER AND LAST MUCH LONGER!
CLEVELAND QUARRIES CQ ABRASIVES
Large and small foundries are enjoying many outstanding advantages from the use of Buckeye Silica Firestone. Especially impressive are its low first cost, ease of installation, high resistance to heat and abrasion, and its important assistance in maintaining scientific cupola control. Important results are lower operating costs, and maximum uniformity in the quality of the metal.
For long, continuous heats, dimension blocks of 6" and more in thickness are used for lining and patching . . . they offer any desired thickness of lining with a minimum of cutting.
Standard machine-cut, sawed two sides cupola blocks of Buckeye Silica Firestone can be supplied in any required thickness.
Whatever your cupola problem, there is a Buckeye Silica Firestone solution for it . . . our service organization will gladly consult with you at no obligation.
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Rectangular Sawed Two Sides. Machine-Cut Liners
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● Send for your copy of Buckeye Silica Firestone Bulletin 15-B. It's free for the asking.
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SILICA FIRESTONE

WHICH SILICA CEMENT WOULD *YOU* USE....?

ORDINARY SILICA CEMENT

THIS?

TAYCO-40 SILICA CEMENT

OR THIS?

TAYCO-40 is the ideal low alumina silica cement for bonding *super-duty* silica brick and shapes.

Ask for New Bulletin on TAYCO-40

Write for a sample of TAYCO-40 and your copy of new Bulletin No. 507, containing interesting data and showing different applications of TAYCO-40.

Compare the *smooth workability* of TAYCO-40, with the poor trowelling properties of ordinary silica cement as shown in above photographs. Ordinary silica cements "crawl" when trowelled, making it difficult to rub or slide the brick in place. Joints are sandy, tend to be thick. TAYCO-40, unlike ordinary silica cements, will retain water and remain plastic when applied to porous silica refractories, allowing ample time for laying and fitting. TAYCO-40 is *easy* to use. Thinner, tighter joints are obtained. Less cement is required. Losses in mixing and handling are reduced.

TAYCO-40 has a softening point nearly equal to the best grades of silica brick. In furnace heat-up, there is no pinching of the brick as the ceramic bond is *not* formed in TAYCO-40 until *after* the bricks have passed through critical stages where abrupt volume changes occur.

For an *easier, better* masonry job, bond your silica refractories with TAYCO-40. Can be dipped, poured or trowelled. Used by leading steel mills and foundries throughout the United States and Canada.

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(*Concluded from page* 252)

tures. With installation of oil burners in three ovens, it became evident the fourth oven would not be needed.

When the burners were being installed the brickwork in the ovens was completely renovated to correct flood damage of past years. New bottoms were laid and the old fire walls removed. New steel frame doors filled with an insulating cement replaced the old brick-lined cast iron doors which had been made in the foundry years before.

With the change from coal to oil firing the annealing cycle was reduced from ten days to six. Consequently, the annealing department, which always had been behind schedule, on occasion now must wait on the foundry for enough iron to fill an oven.

The satisfactory situation in the annealing department upon installation of the oil burners proved rather short lived, however, as the nationwide oil shortage cut off deliveries after one year of use. The only alternative was to put in gas, and this changeover was recently completed.

Type of castings produced by the company has changed less than the production facilities. About 60 per cent of the output goes to farm implement manufacturers. Automotive parts produced include steering gear housings, axle hubs, etc. Specialty items such as ladder hooks and braces, railing fittings, mine trolley wire fittings and railroad lubricator parts are among other production items. Production of all castings has risen from a yearly average of about 625 tons during the three years prior to the reorganization to an average of 1925 tons since then.

Steel Foundries Win Awards for Safety

During the recent fall meeting of the Steel Founders' Society of America, awards were made to the winners of the 1948 national safety contest which has been conducted by the society under the sponsorship of the safety committee. Results of the 1948 contest were exceptionally satisfactory and a large number of steel foundries won awards.

The following were plaque award winners in each of four groups:

Group No. 1, 1000-25,000 manhours, cumulative frequency rate 0—Deemer Steel Casting Co., New Castle, Del.; Hartford Electric Steel Corp., Hartford, Conn.; Malcolm Foundry Co. Inc., Newark, N. J.; Malleable Iron Fittings Co., Branford, Conn.; Quincy Steel Casting Co. Inc., North Quincy, Mass.; Eastern Malleable Iron Co., Wilmington, Del.; Berkley Machine Works & Foundry Co. Inc., Norfolk, Va.; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; Hughes Tool Co., Houston, Tex.; Brewster Co. Inc., Shreveport, La.; Atlas Foundry & Machine Co., Tacoma, Wash.; Washington Iron Works, Seattle; Pacific Steel Casting Co., Berkeley, Calif.; Vancouver Iron & Steel Foundry Co., Vancouver, Wash.

Group No. 2, 26,000-47,000 manhours, cumulative frequency rate 0—Mackintosh-Hemphill Co., Pittsburgh; Lunkenheimer Co., Cincinnati; Burnside Steel Foundry Co., Chicago; Electrocast Steel Foundry Co., Cicero, Ill. Group No. 3, 48,000-90,000 manhours, cumulative frequency rate 0—Atlantic Foundry Co., Akron; Machined Steel Casting Co., Alliance, O.; Dayton Steel Foundry Co., Dayton, O. Group No. 4, 91,000 man-hours and up, cumulative frequency rate 2.8—Carnegie-Illinois Steel Corp., Johnstown, Pa.

The following received certificates of achievement for cumulative frequency rating of less than 10:

Group No. 2, 26,000-47,000 manhours—Atlas Steel Casting Co., Buffalo. Group No. 3, 48,000-90,000 manhours—Bethlehem Steel Co., Bethlehem, Pa.; Penn Steel Castings Co., Chester, Pa. Group No. 4, 91,000 manhours and up—General Steel Castings Corp., Eddystone, Pa.; American Steel Foundries, Granite City, Ill.; General Steel Castings Corp., Granite City, Ill.; Chapman Valve Mfg. Co., Indian Orchard, Mass.; Worthington Pump & Machinery Corp., Harrison, N. J.; United Engineering & Foundry Co., Pittsburgh; Symington-Gould Corp., Depew, N. Y.

Letters of honorable mention were awarded to: Atlantic Steel Castings Co., Chester, Pa.; Crucible Steel Casting Co., Lansdowne, Pa.; Dodge Steel Co., Philadelphia; Diebert, Bancroft & Ross Co. Ltd., New Orleans; Ross-Meehan Foundries, Chattanooga, Tenn.; Continental Foundry & Machine Co., Pittsburgh; Buckeye Steel Castings Co., Columbus, O.; Duriron Co. Inc., Dayton, O.; Falk Corp., Milwaukee; Forging & Casting Corp., Ferndale, Mich.; Continental Foundry & Machine Co., E. Chicago, Ind.; Sivyer Steel Casting Co., Milwaukee; Western Alloyed Steel Casting Co., Minneapolis; West Michigan Steel Foundry Co., Muskegon, Mich.; Omaha Steel Works, Omaha, Nebr.; Vulcan Foundry Co., Steel Div., Oakland, Calif.

The safety committee met recently in Cleveland and established rules for the 1949 contest.

Book Review

Development of the Metal Castings Industry, by Bruce L. Simpson, cloth, 216 pages, 8 x 11½ inches, published by the American Foundrymen's Society, Chicago. Price, $7.50.

For many years the foundry industry has needed a full presentation of the early history and the developments in the production of castings. While many articles have been published on various phases of castings progress, the tremendous amount of work required to search through the available data, make decisions on conflicting references, and condense the information into an interesting volume has frightened away our historians of the foundry industry.

Publication of "Development of the Metal Castings Industry" fulfills the need for a foundry history. Bruce L. Simpson, president, National Engineering Co., Chicago, has rendered a great service to foundrymen everywhere by preparing a volume which gives life to the glamorous and thrilling past of the metal castings industry. In addition to the well written text, the author and the society have collected 198 interesting illustrations which add materially to the value of the volume. A special word of praise should be given to those who prepared the layout and typography.

Mr. Simpson first considers the prehistoric development of metal, and then pictures the early Oriental contributions to foundry practice. He traces the growth of civilization and castings in the Mediterranean Basin, and the melting and molding methods of the Renaissance. Special attention is given to the casting of bells and guns, and to the early practice of casting in sand with metal direct from the blast furnace.

Beginnings of the foundry industry in America, the progress of the industry in the nineteenth century and the development of the mechanized foundry of the mid-twentieth century complete the work.

Names Incorrect

THE FOUNDRY regrets that it was furnished incorrect names of certain plant officials of Kirk & Blum Mfg. Co., Cincinnati, which accompanied the illustration on page 114 of the January issue. Individuals in the back row, left to right, should have been listed as: R. W. New, Joseph A. Fries, R. B. Werner, C. S. Furman, Joseph Hetzer, C. S. Hulton, John Hetzer, S. L. Cox, M. G. Stock, E. A. Carsey and E. W. Thiery.

. . . By CORRECTING PROBLEMS Like These

poor sand conditioning

A New York Foundry says of its Sandcutter: "We find the sand is far more properly mixed and the moisture is distributed evenly throughout the heaps. We find we are able to use finer sand due to thorough mixing and, of course, get a better finish."

high cost

From an Ohio Foundry: "With our Sandcutter we found that we were able to reduce our costs greatly, obtain a more uniform sand which in turn aided us in increasing our production, reducing our foundry losses and producing a casting of better finish."

molding defects

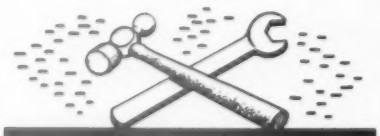
A Wisconsin Grey Iron Foundry reports: "We have found that we have cut our molding scrap losses better than 35% with our Sandcutter as compared with the hand method of cutting sand."

low productivity

From Chattanooga, Tennessee: "Before our Sandcutter was installed we were operating twenty-two floors, requiring the services of three shakeouts. At the present we are operating thirty-one floors with no increase in labor."

absenteeism

In Jersey City: "Absenteeism was formerly a serious condition with the night crew, but now that the Sandcutter has disposed of the "back breaking labor"of continuous shoveling, we have also disposed of our absentee problem."



excessive maintenance

Concerning the Model "M" Sandcutter: "The maintenance of this machine is very small, and very little repair work has been done on it. I would certainly recommend this type of machine to anyone interested."

Write for Complete Catalog

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Products. Send for your free copy today.

American Sandcutters

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.

STEELMAKING AT A BRITISH FOUNDRY

(*Continued from page* 73)

is then rammed using Swift's patent graphitized dolomite. This is dead burnt dolomite ground to a definite grading, approximately 50 per cent rice size and 50 per cent dust, with the addition of 1½ per cent flake graphite. Adding graphite increases the thermal conductivity of the dolomite and therefore increases the depth of sintering. Sufficient material to give the required bottom thickness is dumped in the furnace and consolidated by treading. Ramming is completed by hand using 1 and 2 in. diameter, then 4 in. square, heavy steel ramming tools in sequence. A former built up of mild steel plate and consisting of three sections, two cylindrical and one tapered, is lowered in the furnace and centralized. The two upper sections are unbolted from the lower one and lifted out by the crane; the lower section has a 70-degree taper from the horizontal.

After ramming the banks 6 in. at a time in a similar way to the hearth, a cylidrical section is bolted on and ramming continued for a further 6 in. At this point the graphite content is increased to 4 per cent, and 5 per cent of 3-in. nails are added. The technique now consists of treading followed by ramming with the 4-in. square tools. At 6-in. vertical intervals strips of wire netting 3 ft long and 9 in. wide are laid flat on top of the rammed dolomite. Laid on these strips are 12-in. lengths of ¼-in. diameter mild steel rod, bent at 90 degrees and passing through slots burned in the angle irons. These are standard 2-in. angle irons, 24 in. long; 12 of them are equally spaced and welded onto the shell in a vertical position. The remaining section is added and ramming continued to within 2 in. of the top of the shell. A 3-in. course of chrome magnesite brick surmounts the 12-in. dolomite wall and protects it from silica drip from the roof. Because of the high temperatures involved the amount of silica drip is considerable, and would otherwise lead to serious channelling of the walls due to the formation of low melting point silicates.

Remove The Former

To remove the former the top section is first unbolted to separate it from the lower two. The bolts connecting the three segments of the top section are then unfastened and the segments removed separately using the slotted holes to collapse and release the first one. The other two sections are taken out in a similar manner.

Flat pieces of scrap are used to plate the bottom and banks of the furnace which is then filled up by hand. Melting is commenced on the highest voltage tapping and the heat worked normally.

The door arch and upper portion of the jambs are built of silica brick and are usually renewed at the week-end to avoid the possibility of a mid-week shutdown which would seriously disorganize the foundry. Difficulty was experienced in getting any type of refractory to stand up to the mechanical abrasion and slag attack to which the lower jambs are subjected. The final solution was to place a thin mild steel sheet on the inside, wedge it in position by heavy pieces of scrap and put a similar sheet on the outside held in place by a loosely laid course of bricks. Finely ground dolomite was rammed into the intervening space, then the upper jambs and walls built on it. The front sheet and loose course of bricks were removed and a wide

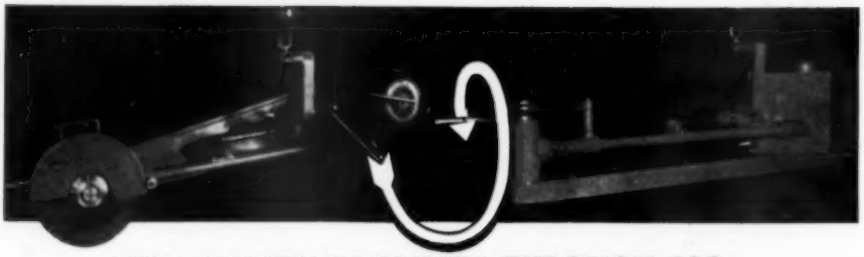
(*Continued on page* 258)

For fast removal of sprues and risers from Bronze . . . Aluminum and Iron Castings!

FOX

SWING FRAME

CUT-OFF MACHINE



FULL MANEUVERABILITY THROUGH 180°

The new Fox Swing Frame Cut-Off Machines have been designed to take advantage of the new type "flexible" cut-off wheels. The machine has full maneuverability through 180°. It is especially recommended for the removal of sprues and risers from bronze, aluminum and iron castings.

Available in two sizes, 16" and 20". Write for Catalog!

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.

350 Feet of Conveyorized Core Ovens DoDgE a Maze of 55 Posts 10′ Centers

ENGINEERS Draw on 46 Years of Experience to Lick Another Tough Problem

Flexibility of DESPATCH equipment—plus 46 years of accumulated oven experience—made the planning and installation of these two conveyorized ovens "just another job" for DESPATCH engineers. These two gas-fired ovens modernized the corebaking facilities of a large Midwest manufacturer of farm tractors.

Not one square foot of floor space was wasted. Heaters, fans and motors were sandwiched in between posts 8′ apart in the 6′ space from oven top to ceiling. The sketch above indicates how the ovens themselves fill all the available floor space. Result: *maximum capacity for continuous baking of large and small cores.*

Whether you need a standard batch or drawer type oven or a large, conveyorized, high-production unit, DESPATCH can help you plan and install an oven to fit your requirements.

Batch Type Mold Oven

Batch Type Finish Baking Oven

Pot Type Tempering Furnace

DESPATCH Engineers Ovens for *All* Industrial Heating, Drying, Baking

FOUNDRY OVENS: Many standard oil or gas-fired batch or drawer type units available, special units built to fit your needs. Fast, uniform convection heat . . . no baking rejects.

BAKING-DRYING OVENS: Fast, efficient, low cost ovens for frit, plastics, coil and armatures, etc. Any size from small lab ovens, thru tray or rack models, to large conveyor installations.

COMPLETE FINISHING SYSTEMS: Ovens, Conveyors, Bonderizers, Spray Booths, Air Conditioners and Dryers.

INDUSTRIAL FURNACES: All types and sizes for temperatures up to 1250° F., including 100% mechanized units; gas, oil or electric. For ferrous or non-ferrous work: heat treating, stress relief, aging, bluing, tempering, drawing and metal tests.

Write today for Bulletin J-31. See Despatch Bulletin in 1949 Sweet's File for Mechanical Industries.

621 S. E. 8th Street, Minneapolis 14, Minnesota
221 N. LaSalle Street, Chicago, Illinois

DESPATCH OVEN COMPANY

(*Continued from page* 256)
channel cut for the first slag off.

Chrome magnesite squares are used for the tapping arch jambs and surmounted by 14-in. squares to form a lintel arch. This type of arch will normally last one or two weeks.

As the shop ceases production on Saturday morning and starts melting again Sunday night, the walls are patched on two consecutive week-ends and renewed on the third. In many cases the walls might last a further week but the maintenance of uninterrupted production is more essential than a slight saving in refractories. Patching is done on the Sunday night shift before melting starts. Pea-size dolomite is mixed by hand with 6-10 per cent warm gas works tar and used for repairing the slag line. Thin mild steel sheets are held against the thinnest portions of the wall by heavy pieces of scrap and finely ground dolomite loosely tamped down between the sheets and the old wall. If the fine dolomite shows any tendency to run out between the bottom edge of the sheet and the old wall, the gap is sealed by the tar-dolomite mix just mentioned. Charging is completed by magnet and the power switched on for the first heat of the week.

After a run of three weeks the furnace crews are brought in on Sunday morning. If the walls are very thin they are stripped back to the shell, but if 3 or more inches remain after removing the oxidized face the new lining is rammed onto the original material. It is usually necessary to strip right down to the shell every six weeks. During the three-week run the banks and bottom build up 2 or 3 in., reducing the furnace capacity and raising the slag line to a dangerously high level. The built-up material is contaminated by slag and metal and is removed as far as possible, the best method is to take the bottom and banks back to their original contours.

A demarcation line makes it obvious where the built-up portion ends, and leaving the furnace with the roof off for 24 hours before starting the reline assists in loosening this material because of the β-γ inversion of the dicalcium silicate in the slag with which it is impregnated. As soon as the stripping down and cleaning out has been completed the former is inserted and levelled off. It has been found advisable to offset it to give a 13-in. wall next to the king-post and 11 in. on the other side, thus strengthening the wall in the position of maximum wear; ramming is then completed as previously described.

Sometimes it is impossible to clean down the banks and bottom sufficiently to get the bottom section of the former in position. In such a case the upper two sections are used and the seal between the old bank and the base of the former made with the same tar-dolomite mix that was used for repairing the slag line. The first charge after relining is put in by hand, then melted and worked in the normal way.

Acid Furnace Lining—On the acid furnace a 3-in. course of firebrick is laid on the shell and two 3-in. courses of silica brick on top. The walls are then built using 13-in. silica crowns and the hearth rammed to a wooden template. A pure silica sand, fine ganister and 5 per cent ball clay are mixed in one of the sand mills, and the moisture content adjusted to 4 per cent using a 5 per cent solution of sulphite lye in water. The mix is tamped into position using 4-in. square wooden rammers. About 500 lb of coke are shoveled into the furnace and the arcs struck. The power input is adjusted so that a tempera-

TRANSITE CORE PLATES are lighter, stronger, resist warpage.

● Core makers can handle more Transite* Core Plates at one time, thus make fewer trips. That means faster production with less fatigue and fewer accidents. Transite Core Plates offer all these advantages:

They Last Longer—Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

They Clean Easily—Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist Corrosion and Warpage—Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are Economical—Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

For full details, write Johns-Manville, Box 290, New York 16, New York.

JM PRODUCT

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Johns-Manville **TRANSITE CORE PLATES** MADE OF ASBESTOS

ture of 2800° F is reached in eight hours.

A steel bar is used to test the hardness of the banks; if they are satisfactory the furnace is back tilted and as much of the coke as possible is removed before charging by magnet. Although the first heat inevitably melts out high in carbon, it is boiled down and used for the production of steel castings in the usual way.

The only routine week-end patching needed on the acid furnace is a slag line repair using fine ganister mixed with 10 per cent ball clay, and moistened with water.

When new side walls are required the old brick-work is stripped down and the bank chipped to give a 13-in. thickness as a firm base for the new wall. As soon as the wall has been built the banks are topped off with the same mixture that was used for ramming the hearth. The furnace is hand charged, melting is commenced and carried through on a low voltage tapping.

Charging—The charging buckets are provided with hinged leaves at the bottom; these are tied together with two turns of ½-in. sisal rope immediately after the furnace has been charged. The weighing machine is centrally situated so that it is convenient for each of the scrap bins. When a charge is made up the bucket is placed on the weighing machine and tared off. First of all the heavy scrap is placed on the bottom and followed by the lighter material. Lifts of chipped turnings, small clippings, etc., are added at intervals to fill up the interstices and a few hundred pounds of unchipped turnings on the top of the charge enable the arcs to bury themselves quickly and so reduce the danger of burning the roof around the electrode ports in the early stages of the melt. An average charge would be: 5000 lb of foundry scrap, 2500 lb foreign scrap (heavy) 2000 lb foreign scrap (light), 2000 lb chipped turnings, 500 lb bushy turnings.

Foundry scrap consists of gates, risers, heads, rejected castings, etc. Foreign scrap is purchased to a size specification to ensure that there are no pieces large enough to scaffold in the charging bucket and thereby reduce its capacity. Long and awkward pieces of scrap often lead to slow melts as they do not fall in readily. Some turnings are bought already chipped; others, and those from the company's machine shops, are chipped by a machine situated between the railroad track and the scrap bins.

All scrap is purchased to the following chemical specification: 0.050 per cent max S and P, 0.50 per cent max—Ni, 0.30 per cent max—Cr, 0.15 per cent max—Mo. Consignments may be purchased outside these limits but they must be segregated and used only on certain grades or, if the sulphur and phosphorus limits are exceeded, only in the basic furnace. One man working on the day shift makes up all the charges needed for the 24-hour run on both furnaces.

When the furnace is ready for charging the roof is swung and the bucket lowered into position, the rope quickly burns away and allows the leaves to swing open. The bucket is then withdrawn leaving the charge in the furnace. An ideal charge will just occupy the entire furnace. If the scrap is too light it is impossible to get all of it in the furnace and time is lost in back charging. A fairly heavy charge may melt out well but if it is too dense a top melt may result. This occurs when the upper portion of the charge melts and runs down to weld together the scrap underneath; later a shallow pool of metal forms on top of several inches

A Foundryman* tells us—

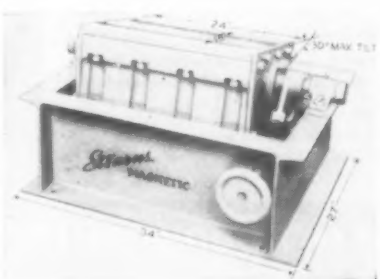
How he cuts grinding costs

The STEARNS GRINDER Holding Magnets installed in our foundry have enabled us to reduce costs more than 30% in overall grinding time by eliminating the use of jigs, clamps, wedges and other devices normally needed for grinding castings, etc.

All we have to do now is lay the casting on the magnet, trip the switch and the work is held securely and safely.

Maintenance cost is negligible and these magnets are performing so satisfactorily that we intend to add several more to our present grinder holding magnet set-up.

*Name on application



Easy tilting trunnion available in various sizes for applications requiring angle grinding or positioning of work.

Operates on D.C. voltage, wound to suit your requirements. Hand or foot switch optional. A very flexible job that will definitely improve your swing grinding operation. A strong powerful magnet of rugged design and construction for tough work.

STEARNS MAGNETIC

Manufacturing Company

662 So. 28 St. Milwaukee 4, Wis.

PULLEYS—DRUMS—SEPARATORS—MAGNETS

of solid scrap. The roof tends to overheat and is is extremely difficult to initiate a boil to lift the scrap off the bottom. Another type of heavy charge that causes trouble is one that contains too many large pieces of scrap; these tend to roll down off the banks and break the electrodes once falling-in commences.

Basic Melting Practice—As soon as the roof has been swung back into position after charging the furnace melting is commenced at full power, i.e., 5000 amp at 200 v. An hour and a half later it is usually possible to obtain a sample from the furnace. This is killed with aluminum wire and cast into a small slab 3 in. long, 1½ in. wide and ½-in. thick; this sample is quenched and broken so that the carbon content can be estimated by examining the fracture. Additions of limestone or spar are made, depending on the slag viscosity, and ore is used if the carbon seems to be over 0.30 per cent. There are three advantages in oxidizing during the melt:

1. Low temperature, a basic slag and oxidizing conditions all favor the removal of phosphorus.

2. If the bath is kept on the boil it not only assists in eliminating sulphur and phosphorus, but prevents the formation of a quiescent, reflecting surface. Under these conditions a high rate of heat input can be maintained and the production increased without undue damage to the furnace lining.

3. Action of the boil assists in clearing the scrap from the furnace bottom.

When most of the scrap has been melted in and the temperature of the furnace structure nears 3000° F the voltage is reduced to lessen the power input and at the same time shorten the arc. As soon as the bath has melted clear a sample is sent to the laboratory for analysis.

Oxidizing—Strongly oxidizing conditions are maintained by ore additions and the slag basicity adjusted by adding limestone. Using fracture samples the boil is continued until the carbon is between 0.08 and 0.12 per cent. The bath and slag conditions at this stage closely resemble those in the basic open-hearth furnace except that there is far less gas oxidation owing to the entirely different character of the furnace atmosphere. To make good quality steel low in hydrogen and as free as possible from nonmetallic inclusions both slag and metal at this stage must be hot and fluid, the lime-silica ratio at least 3:1 and the iron content of the slag at least 15 per cent.

A slag of this nature will reduce the phosphorus content of the bath to below 0.01 per cent and will also eliminate some of the sulphur. Its main function, however, is to saturate the bath with iron oxide as the dissolved oxygen in the steel is largely dependent on the iron oxide content of the slag once the carbon is below 0.10 per cent. This, coupled with the action of the boil which has already taken place, will ensure almost complete freedom from hydrogen in quantities likely to cause any trouble.

The other function of a high percentage of dissolved iron oxide in the bath is to form low melting point inclusions with the silica resulting from the oxidation of the silicon in the charge and to assist in the formation of similarly low melting point inclusions when the silicomanganese additions are made. Normal practice is to clean up the bath by a manganese reboil using 20-30 lb of ferromanganese, then slag off 5-10 minutes later.

If a steel containing more than 0.25 per cent carbon is being made the same procedure is followed and the

THE AJAX-Tama-Wyatt Low Frequency Induction Furnaces are now made in small sizes with capacities ranging fom 20 to 35 kw.

Their operation is based on the induction principle whereby energy is transmitted to the molten charge without actual contact, through the refractory walls. Only the metal is heated, and therefore, there are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. A gentle movement of the bath insures uniform temperature and homogeneous mixing of the alloy ingredients. Linings are made of inert refractories which do not contaminate the melt.

These melting machines are delivered with self-contained, completely factory wired control cubicles, including automatic temperature controllers.

Over 250 AJAX Tama-Wyatt Furnaces are in continuous service.
AJAX ENGINEERING CORPORATION, Trenton 7, N. J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

bath recarburized after slagging off by additions of pea-size anthracite to the bare metal. A violent reaction ensues and the iron oxide content of the bath is lowered by the carbon to the equilibrium value, dependent on the carbon-iron oxide product at the bath temperature. The iron oxide content of the bath when the deoxidizers are added is less than if the carbon was caught at the required figure or if recarburization was carried out after deoxidation because an excess of iron oxide over the equilibrium value for the carbon-iron oxide product is necessary to maintain the boil under melting furnace conditions. The dephosphorizing, degasifying and cleansing effects of boiling down to a low carbon content are retained.

Refining — Preliminary deoxidation is accomplished by silicomanganese, sufficient being added to take the manganese to just below the bottom of the range. It is felt that the use of silicomanganese gives more fluid deoxidation products than ferromanganese and ferrosilicon together, and so results in a cleaner steel. Ferrosilicon is added later to raise the theoretical silicon addition to 0.35 per cent. A slag mix of 200 lb of limestone and 40 lb of sand is thrown onto the bath as soon as the arcs have struck and followed by 20-30 lb of calcium carbide. This is used in preference to crushed coke or anthracite as it permits closer control of the final carbon. It also saves time as it can be used far more liberally without fear of carbon pick-up and the slag can be brought into condition much quicker.

As soon as the slag is fluid and its color indicates that its iron plus manganese oxide content is less than 5 per cent, a sample is sent for analysis. While this is being done the slag is shaped up by further additions of calcium carbide plus limestone or fluorspar to adjust the viscosity. The first helper holds the temperature between 2950 and 3000° F by visual tests so that the bath is hot enough to take the additions when they are ready.

By the time the analysis is complete and the ferroalloys weighed up the slag is pure white with an iron oxide content of less than 1 per cent and foaming gently around the electrodes. Ten minutes after the additions have been made a test is taken for the temperature by measuring the time taken for a spoonful of metal to film over and a visual estimate of the silicon content is made at the same time. A sample is poured into a chill mold to check the fluidity and the silicon content, which is indicated by the amount of dip on the upper surface of the sample.

Tapping temperatures on normal grades are between 2980 and 3050° F, depending on which part of the foundry the metal is being cast and the type of casting being made. When the melter judges the temperature to be approximately correct the immersion pyrometer is used to give an exact reading. The power input is adjusted to give the required increment or decrement in the five or ten minutes taken to prepare the ladle. As aluminum addition of 1 lb per ton is made to the ladle to control the grain size and maintain a high yield ratio.

Half the charge is poured into a ladle which is placed on the transfer car and taken to whichever part of the foundry it is required. A second ladle is brought up and filled as soon as the foundry can take it if the entire heat is to the same specification. If two different specifications are being met, a sample is sent to the laboratory immediately

AJAX

HIGH TENSILE

MANGANESE BRONZE

high in strength, toughness and corrosion resistance.....

long time favorite with mfrs. of marine fittings.....

leaves sand clean and bright - takes a mirror-like finish.....

recognized as the highest quality manganese bronze available.....

AJAX METAL CO.

PHILADELPHIA 23, PA.

ASSOCIATE COMPANIES

AJAX ELECTRIC · AJAX ELECTROTHERMIC CORP · AJAX ELECTRIC FURNACE

AJAX ENGINEERING CO

before filling the first ladle, and the analysis of the 2½ tons of steel remaining in the furnace is adjusted on the results received.

As soon as the second ladle has been filled the furnace is levelled off and the wash line patched with dead-burnt dolomite. The electrodes are then slipped so that they rest on the bottom of the hearth, the arms are run up to the top limit and the roof swung ready for charging.

The log of a typical heat is as follows:

Charge—4500 lb foundry scrap, 3000 lb foreign scrap (heavy), 2000 lb foreign scrap (light), 2000 lb chipped turnings, 500 lb bushy turnings, 200 lb limestone.

1.00 a.m.—Commenced charging.

1.03 a.m.—Finished charging.

1.05 a.m.—Power on. 200 v at 5000 amp.

2.45 a.m.—Fracture estimated at 0.35 per cent C. Power input reduced to 160 v at 500 amp. 100 lb of limestone and 200 lb of ore added.

3.00 a.m.—Fracture estimated at 0.35 per cent C. 100 lb of ore added.

3.20 a.m.—Clear melt. Fracture estimated at 0.14 per cent C. Laboratory analysis: 0.15 per cent C; 0.38 per cent Mn; 0.028 per cent P; 0.036 per cent S; 0.08 per cent Ni; 0.02 per cent Cr; and 0.02 per cent Mo. Power input reduced to 120 v at 5000 amp. 100 lb of limestone and 100 lb of ore added.

3.30 a.m.—Fracture estimated at 0.09 per cent C. 30 lb of ferromanganese added.

3.40 a.m.—Power off. Slag removed.

3.43 a.m.—140 lb of silicomanganese added.

3.45 a.m.—25 lb of ferrosilicon (75 per cent Si) added.

3.46 a.m.—Power on. 100 v at 5000 amp.

3.47 a.m.—200 lb of limestone and 40 lb of sand added.

3.50 a.m.—30 lb of calcium carbide added.

3.55 a.m.—10 lb of fluorspar added.

4.05 a.m.—Slag light brown and rather thick. Laboratory analysis: 0.13 per cent C; 1.06 per cent Mn. 10 lb of calcium carbide and 10 lb of fluorspar added.

4.30 a.m.—White falling slag. 67 lb of ferromanganese, 190 lb of hematite iron and 10 lb of ferrosilicon (75 per cent Si) added followed by 10 lb of calcium carbide.

4.40 a.m.—White falling slag. Mirror test 28 seconds. Immersion temperature 3050° F. 10 lb of ferrosilicon (75 per cent Si), 10 lb of calcium carbide and 10 lb of fluorspar added.

4.45 a.m.—First tap. 2½ lb of aluminum in the ladle.

4.55 a.m.—White falling slag. Mirror test 27 seconds. Immersion temperature 3055° F. 5 lb of ferrosilicon (75 per cent Si), 10 lb of calcium carbide and 10 lb of fluorspar added.

5.00 a.m.—Second tap. 2½ lb of aluminum in the ladle.

5.10 a.m.—Finished patching.

5.15 a.m.—Electrode slipped. Furnace ready for charging. First ladle analysis: 0.24 per cent C; 1.59 per cent Mn; 0.27 per cent Si; 0.015 per cent P and 0.013 per cent S.

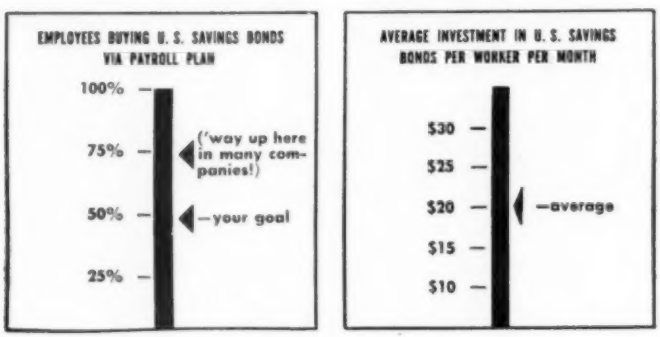
Mechanical Properties: Yield point 53,000 psi, maximum stress 81,000 psi, elongation 34 per cent and reduction of area 46.6 per cent.

Second ladle analysis: 0.25 per cent C; 1.52 per cent Mn; 0.29 per cent Si; 0.016 per cent P and 0.012 per cent S.

Mechanical Properties: Yield point 54,000 psi, maximum stress 81,000 psi, elongation 32 per cent and reduction of area 45 per cent.

(To be concluded next month)

How is YOUR company doing in this "EVERYBODY-BENEFITS" plan?



If the figures for your company fall below those shown above, you're missing your share of benefits of the Payroll Savings Plan! Nation-wide experience proves that when top management puts the "OK" on the Plan, its benefits rise sharply.

Benefits to *Employees*—Every $3 invested in Savings Bonds pay $4 at maturity. Workers gain (1) the means to buy in the future more of the things they will want; (2) the peace of mind that goes with regular saving.

Benefits to *Employers*—Participation in Payroll Savings makes workers more contented. Worrying less, they work better. Among the more than 20,000 large companies with Payroll Savings, records show that worker production increases, absenteeism and accidents decrease as payroll savings participation rises.

Benefits to the *Nation*—The Payroll Savings Plan is a powerful deterrent to inflationary forces. Every Savings Bond dollar built up in the Treasury withdraws a dollar from the swollen spending stream, aiding national security.

What can *You* do?—If your company has the Payroll Savings Plan, make sure it's adequately promoted by your top executives.

If you haven't yet installed the Plan, why pass up its benefits any longer? All the help you need is available from your State Director, Savings Bonds Division, U. S. Treasury Department. Call him today!

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council

SCHNEIBLE DUST CONTROL and VENTILATION

PAYS FOR ITSELF 4 WAYS

FRESH OUTSIDE AIR gives clean comfortable working conditions, thus reducing labor turnover.

NO SMOKE AND DUST eliminates abrasive and corrosive elements thereby lengthening life of motors and other expensive facilities.

BETTER VISIBILITY AND GREATER COMFORT lessens accidents to workmen.

OVERHEAD INSTALLATION of Schneible Multi-Wash system allows valuable floor space to be used for production.

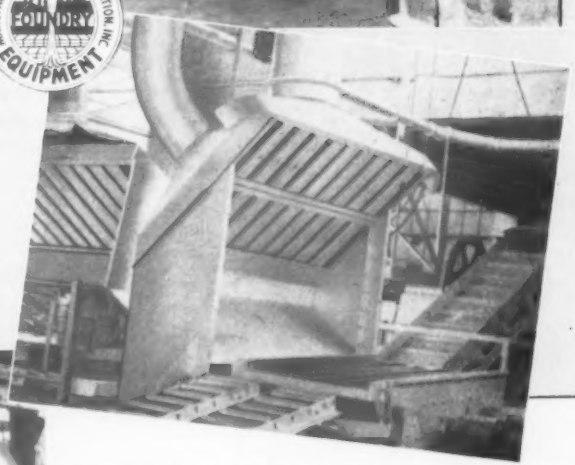
Small Uni-Flo Hood on foundry shake out—note overhead installation of dust collector and usable floor space. Short duct work saves in initial outlay and power.

Schneible Uni-Flo Dust Hoods are made in any practical size for any type of plant layout, adjacent to the process of operation where dust or fumes are created.

The Schneible Multi-Wash Collector can either be inside overhead or outside the building. Duct work does not interfere with normal plant operation.

Compensating-Fractionating Uni-Flo Hood reduces dust collector cost and loss of plant heat.

(U. S. and Foreign Patents applied for.)



Compensating Uni-Flo Hood in operation lowers ventilating and heating costs while improving working conditions.

Free

Write for Standard Uni-Flo bulletin 410 and bulletins 47 and 48 covering all Uni-Flo types.

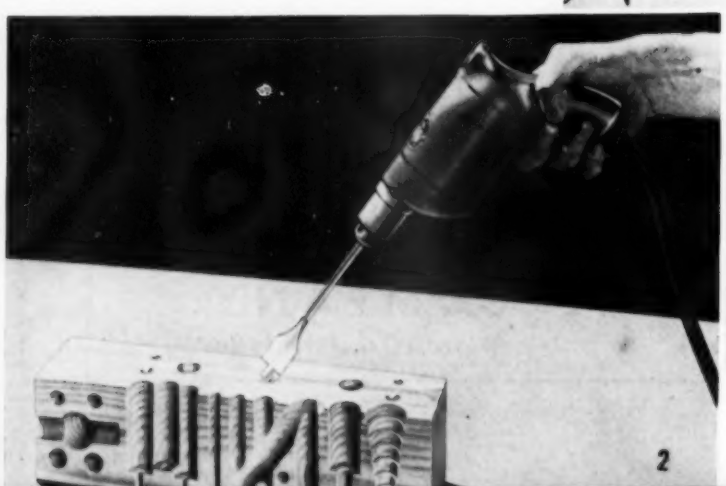
CLAUDE B. SCHNEIBLE COMPANY

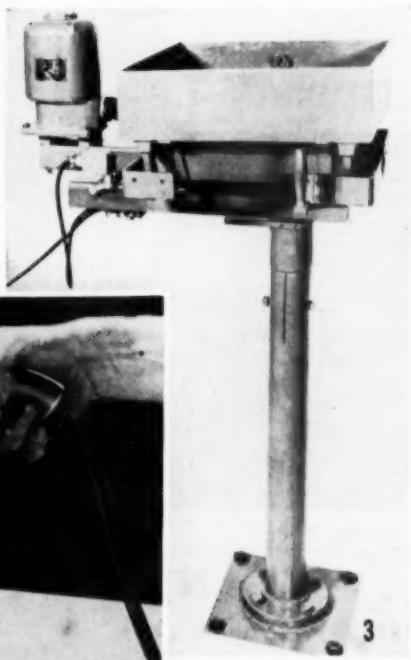
2827 Twenty-Fifth Street • Detroit 16, Michigan

NEW Equipment AND Supplies

(1)—Collapsible Truck: Waprin Corp., 501 South Jefferson St., Chicago 7 — Collapsible, aluminum platform utility truck weighs 60 lb and has a load rating of 1200 lbs, and when not in use may be stored in a space 10 in. deep. Truck is riveted throughout and has a 24 x 40-in. aluminum platform reinforced with aluminum angle running the length of the platform. Truck is equipped with two swivel and two rigid 5-in. double ball bearing casters for easy maneuverability.

(2)—Boring Tool: Rex Laboratories, 1717 Gent Ave., Indianapolis 2—New flat type wood bit is designed for fast, accurate boring of holes in soft or hard woods, even at angles, through knots and without regard to the wood grain. It is intended to be used with drill presses, portable electric or pneumatic drills. Bit is said to maintain hole diameter to plus or minus 0.005 in. Holes can be bored at angles from 45 to 90 degrees without preliminary chiseling and to 4½-in. depth. Chips are unloaded continuously, without removing the bit. Best operating speeds are 750 to 3500 rpm, although holes can be bored in most woods at either higher or lower speeds. Bits are available in sizes from ⅜ to 1⅛ in.





(3)—Power Riddle: Roller Riddle Corp., 3127 Goulden St., P. O. Box 295, Port Huron, Mich.—Power riddle is designed to riddle sufficient sand to cover an ordinary pattern in a 12 x 18-in. flask in two seconds. A ¼-hp single phase motor combined with a limit switch automatically activates the riddle basket, oscillating 900 times per minute. Other types, voltages and sizes are supplied if necessary. The riddle basket has a sand capacity of 60 pounds and rides on rubber blocks. Illustration shows a "double channel" type riddle, but the company also makes a "single channel" type.

(4)—Battery Charge Indicator: Gould Storage Battery Corp., 467 Calhoun St., Trenton 7, N. J.—Charge indicator gives the momentary charge condition of an industrial truck battery, thus keeping the operator informed as to its state of charge while the truck is in operation. Instrument is housed in an all-aluminum case, designed for vertical mounting, and it may be used with 3, 6, 12, 15, 16, 18 and 24 cell batteries, a series of resistors and taps being arranged to permit the desired adjustment. A toggle switch disconnects the instrument from the battery during charge.

Chain Vises: Baldwin-Duckworth Division of Chain Belt Co., 369 Plainfield St., Springfield 2, Mass.—Chain vises simplify the process of taking roller chain apart. The forged steel jaws hold the chain while properly applied blows with an ordinary drift will remove the pin. Two sizes are available—one will handle single width roller chains from ½ to 1-in. pitch and double width roller chains

D-40 to D-160; the other handles single width chains from 1 to 2-in. pitch and double width chains from D-80 to D-160.

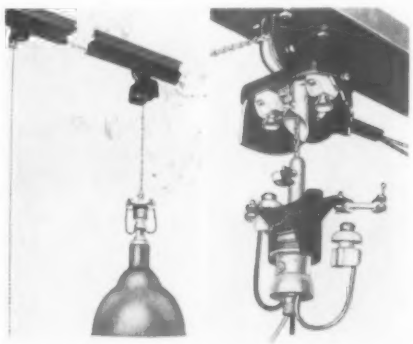
Tractor-Shovel: Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.—New tractor-shovel features four wheel drive and a power-boosted steering mechanism. Bucket

capacity is 1½ cu yd; static loading capacity is 6000 lb, and engine horsepower is 76. Power steering is accomplished through the rear wheels, and fully reversing transmission with four speeds in either direction gives the tractor good maneuverability. Bucket raising and lowering and bucket dumping and closing is accomplished by double-acting hydraulic rams. Powerful digging action is given to the bucket independent of the forward motion of the tractor. Also, automatic quick tip-back of the bucket is provided as it is raised to avoid spillage.

Impact Wrench: Independent Pneumatic Tool Co., 175 State St., Aurora, Ill.—New ⅜-in. universal electric impact wrench has a number of uses including driving nuts, bolts and screws; drilling; reaming; wood boring; tapping, and driving saws, files, burring tools, wire brushes, and sanders. It has a free speed, forward or reverse, of 2150 rpm, strikes 2000 blows per minute, operates on alternating or direct current at 60 cycles, weighs 6 lb, 14 oz and employs a ½-in. square spindle drive with a 1 7/16-in. spindle offset.

Core Blower Equipment: Eastern Clay Products Inc., Jackson, O.—Blow tubes, wear inserts and wear strips in coreboxes, blow plates, and similar applications are offered in wear-resistant plastic. The tubes are said to last 10 to 20 times as long as metal tubes, and to pinch off the sand flush with cores so as to leave no "tips" which must be filed off. The inserts are made of the same resilient, long wearing plastic and are said to reduce replacement time and decrease wear on corebox around the inserts. Wear strip may be cut to any shape; it forms an air seal between box and blow plate, eliminating air leakage and the resultant wear. The resilient plastic material from which these items are made is resistant to oil and does not swell, harden or disintegrate in use, it is claimed.

Fixture Hangers: Thompson Electric Co., 1101-73 Power Ave., Cleveland 14— Disconnecting and lowering hanger is designed for use with all types of high level lighting fixtures located 16 or more feet above floor level. It permits lowering of lights for cleaning, lamp replacement or repair. A complete hanger installation consists of upper and lower assembly units, length of chain or cable for lowering and raising lighting fixture, positive locking device, and a pulley. Fixed upper assembly unit,



secured to supporting structure, carries a pair of cup type contacts to which power feed lines are attached. Lower unit is fitted with two engaging contacts which complete the circuit when assembly is in raised position. They are available for indoor and outdoor installations using incandescent, fluorescent or mercury-vapor lighting and are supplied for manual or winch operation. They will support fixtures weighing up to 200 lb and are rated at 15 amp, 600 v ac; 30 amp, 250 v ac; and 20 amp, 250 v dc.

Heat Mask: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8—Heat mask, designed to provide full face and head protection with unobstructed vision, is made of 30 mesh steel screen which deflects heat away from the wearer and prevents infra-red burns. It weighs 18 oz and is fitted with a fiber chin rest and adjustable headgear. For added protection an optional wool bib and/or snood are available. These are attached by snap fasteners to the headpiece and cover the upper chest, head, and back of the neck.

CO Indicator: United States Safety Service Co., 1215 McGee St., Kansas City 6, Mo.—Indicator is used for the rapid determination of infinitesimal amounts of carbon monoxide in the air. The detector consists of a small glass tube sealed at both ends and a rubber bulb, all packed into a small kit that fits into the pocket. To put into use the tips of the small tube are broken off and one end inserted into the bulb. When bulb is squeezed, a sample of air is drawn through the chemicals in the tube. If carbon monoxide is present the yellow chemicals turn green in 30 seconds. The darker the shade of green the higher the CO concentration. A matching color chart defines the concentration of CO.

Electrode: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Low temperature welding rod designated by the company as No. 24/49 has been developed to produce strong bonds and high tensile welds that are machinable through the weld and the weld zone on plain and alloy gray iron without preheating. The electrode is applied at low currents to produce true low heat welds. For example, the 5/32-in. electrode is said to weld cold gray iron readily at 80-100 amp. It applies quickly and easily on alternating or direct current with either straight or reverse polarity. It is available in 3/32, ⅛ and 5/32-in. dia.

Recorder: Foxboro Co., Foxboro, Mass. — High-speed electronic instrument makes from one to six

different records on one circular chart, the records being of colored dots so closely spaced as to make virtually continuous lines. Recorder

SAHARA
Heat Resisting
BELTING
For Handling
Hot Materials

Foundries find Sahara Belting unexcelled for conveying and elevating hot materials. This has been definitely proved in actual service by test after test.

For handling materials up to 300° F., **Standard Sahara** is recommended. For sustained temperatures from 300° F. to 450° F., **Insulated Sahara** combines asbestos and special insulating material with the cotton base.

Special Impregnation

The heat resisting efficiency of Sahara Belting is due to special impregnation and insulation, developed by Imperial during the past 30 years. The base of both Sahara and Insulated Sahara is 37½ ounce, tight-woven duck with a tensile strength of over 700 lb. per inch of width. Ply separation is permanently prevented by our double-stitched, Inner-Locked construction.

Write for Data Sheet 47-8, and prices on Sahara Belting.

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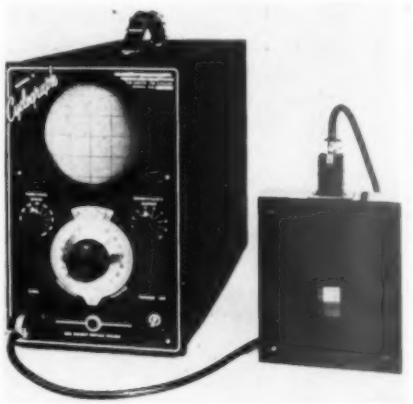
Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

has one measuring system, either resistance bulb or electromotive force type, but a positive acting switching unit automatically brings the varicolored pens into recording position at 6-second intervals in any sequence desired. Instrument may be used for measurement of temperature, pressure, humidity, liquid level, pH, conductivity, speed, and other process variables.

Tempering Furnace: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44—New steam homo tempering furnace is designed for scale-free tempering and strain relief if metal parts at temperatures up to 1150° F. Use of a protective steam atmosphere, fed into the work chamber through an inlet in the bottom of the furnace, is said to permit turning out steel parts with a uniform blue oxide finish. Parts are said to be free from scale, have improved machinability, increased resistance to corrosion and wear and to be easier to clean for subsequent plating. Although designed for steam tempering, the furnace can be run with natural air atmosphere.

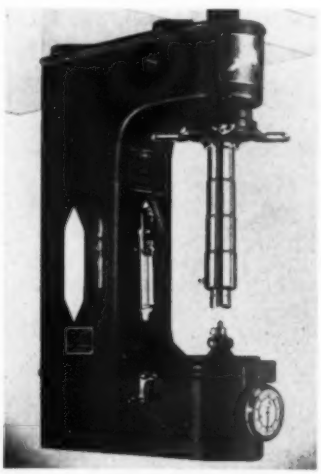
Unit Heaters: United States Radiator Corp., 300 Buhl Bldg., Detroit—Heaters are made for either steam or hot water heating systems and are said to provide uniform heating with large broad blade propeller fans which furnish a maximum of air movement with a minimum of noise. Motors are resiliently mounted in rubber. The horizontal model, designed for mounting along a side wall or suspended from the ceiling of a room, is available in 16 sizes which furnish heat output ranging from 24,000 to 240,000 Btu per hr. Vertical model, which blows air downward, is designed for ceiling mounting. Its fan and motor assembly is said to be easily removed for repair. It is available in 28 sizes, providing heat output ranging from 37,200 to 492,000 Btu per hr.

Analyzer: J. W. Dice & Co. 191 River Rd., Grand View-on-Hudson, N. Y.—Portable instrument, operating on the core loss principle, is designed for rapid and nondestructive metallurgical examination and sorting of metal parts. It will check or sort metal parts on the basis of analysis, structure, hardness, case depth,



and in some cases stress concentration. It can be employed also to trace internal stress changes, compare stresses at different levels, or measure stress in pounds per square inch (by calculation). A recorder output is provided for this use of the instrument. Frequency range is 2 to 200 kc and test coil may be placed up to 12 ft from the instrument. Instrument weighs 50 lb, operates on 115 v, 40-60 cycles. Power consumption is 70 watts.

Hardness Tester: Clark Instrument Inc., 10200 Ford Rd., Dearborn, Mich. — New model tester with cast aluminum body is 65 to 85 lb lighter than its predecessor. It is used



for Rockwell testing of hard and soft steel, brass, aluminum, cast iron, copper, other metals, alloys and plastics. Features of the instrument include a frictionless spindle said to assure a

(*Continued on page* 268)

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

How much would NO advertising cost your company ?

SOME COMPANIES look upon advertising as an expense. When expenses have to be cut, the advertising budget looks like a good place to begin.

The only trouble with that theory is — it won't work.

Advertising can become expensive when you don't use *enough* of it. And "NO advertising" can cost far more than the "saving" it appears to create.

It's like failing to lubricate a piece of valuable machinery. You save the cost of the lubricant — but eventually there's a big repair bill to pay, not to mention your production losses while the machine is idle.

Advertising works something like a machine. It is the application of assembly-line methods to the five basic steps in the manufacture of a sale —

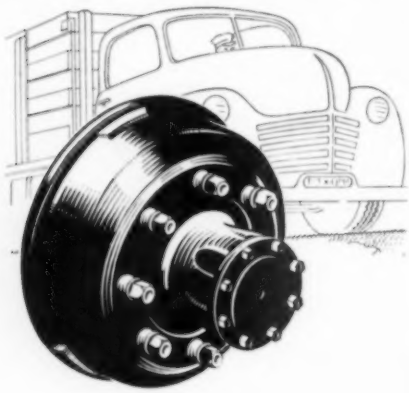
1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Can advertising perform all five of these steps? No, it usually takes a good salesman to handle the last two. But advertising *can* save much of his valuable time.

By mechanizing the *missionary job*, advertising becomes the most efficient method of manufacturing sales at a profit. Especially when it appears in the business press, where it is concentrated among your company's best prospects — *and no one else!*

THE FOUNDRY—

is a member of The Associated Business Papers, who have published an interesting folder entitled, "How much does NO advertising cost?" We'll be glad to send you a copy. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, just say the word.



Wear- and heat-resistance —together

The addition of Molybdenum to cast iron has specially applicable effects where good resistance to wear must be combined with least susceptibility to cracking under sudden changes of temperature.

Brake drums, for instance: here is a well-proved composition, 3.70% Total Carbon, 1.80% Silicon, 0.80% Manganese, with 0.50% Chromium and 0.70% Molybdenum added.

This is one of the many suitable economical compositions in our new booklet, "Applications of Molybdenum Cast Irons." The busy foundryman and engineer will find the alphabetical listing useful—write for a copy!

Climax Molybdenum Company
500 Fifth Avenue
New York City

Please send your FREE BOOKLET "Applications of Molybdenum Cast Irons"

Name.....

Company.....

Address.....

MOLY

F2 F 11

(*Continued from page* 236)

correct minor load; positive tripping for a more accurate major load; and an elevating screw fully enclosed for protection from dust, grit and rust. It is available in three standard models with 8, 12 or 16-in. vertical capacity.

Chipping Hammer: Chicago Pneumatic Tool Co., 6 East 44th St., New York 17—Small air chipping

hammer features a jet blower device for cleaning off work surface and extra smooth throttle action, provided by an exclusive pulley valve design. The tool will do a number of light chipping jobs including the chipping of rust, scale, weld flux and chiseling wood in pattern shops. It weighs slightly over 4 lb and is just over 10 in. long. Either a lever or push throttle is available, and equipment includes a chisel.

Lift Truck: Transitier Truck Co., 2477 Northwest 23rd Ave., Portland 10, Oreg. — Fork lift truck is powered by a four-cylinder fabricated gasoline engine of 26 hp, has 61-in. turning radius and hydraulically

operated lift and tilt of load-carrying mast. Truck features a hydraulically operated clutch located behind and above the engine for easy accessibility. Clutch adjustment or replacement is said to be possible in 15 minutes. Truck is available in 5, 7 or 9-ft lift heights and 1000 or 2000 lb lift capacities.

Welding Machines: Metal & Thermit Corp., 120 Broadway, New York 5—New group of alternating and direct current arc welding machines is offered. Features of the alternating current unit include built-in power-factor corrector; fingertip stepless current control; fan-forced ventilation; wide current range; moderate open circuit voltage operation. Units are of the transformer type, available in 150, 200, 300, 400 and 500-amp. capacities. Major design feature of the direct current models is a one-dial, simplified control panel which carries a series of well marked outlets, each one for an electrode of different diameter. Motor-driven direct current units are available in 150, 200, 300 and 400-amp capacities. Engine driven welders include 200, 300 and 400-amp sets.

Foot Bath Tray: Stalwart Rubber Co., 219 Northfield Rd., Bedford, O. — One-piece molded rubber foot bath tray is specially compounded to withstand the chemical action of antiseptics used in combatting athletes foot and ringworm.

Tray has waffle tread molded on inner bottom to prevent slipping and consequent injury to personnel. It measures 21 x 21 x 3 in., weighs approximately 22 lb and has rounded corners which facilitate quick, easy cleaning. It is said to hold sufficient solution to accommodate hundreds of users before refilling is necessary.

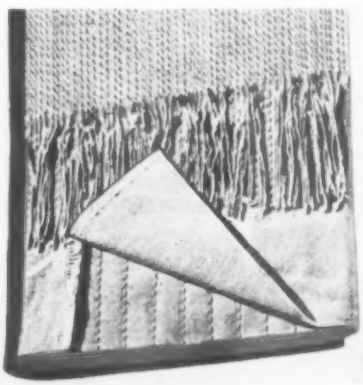
Flame Failure Safeguard: Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.—Designed to provide protection against the hazard of explosion caused by flame failure in industrial oil burner installations a control system supervises both the pilot gas flame and the main oil flame of fully automatic oil burners. Equipment consists of electronic flame rod, photoelectric scanner and programming control. The flame rod "feels" the gas pilot flame. If the pilot flame has not come on or is unsuitable for proper ignition, the flame rod signals this condition to the programming control

and the burner shuts down before the main oil valve has opened. With proper ignition, the main oil valve opens and the oil flame is then monitored by the photoelectric scanner. Equipment operates on 115 or 230 v, 60-cycle, ac.

Asbestos Gloves: Wheeler Protective Apparel Inc., 229 West Huron St., Chicago 10—Asbestos

gloves are 14 in. long and have full finger and palm leather reinforcement as well as saw-tooth leather reinforcement on glove back for free finger flexing. Leather thumb seam strap protects entire seam. Designed for comfort as well as wear, the gloves have a roomy fit and soft tubular knit lining.

Canvas Belting: C. R. Daniels Inc., Baltimore, Md.—Stitched canvas belts are available for standard conveying purposes, for abrasive materials, for oil and grease conditions, for excessively hot materials, for sanitary products, package conveying and power transmission. Company's belts are made with a special, separately sewn core over which is



placed a cover and the assembly sewn together at ¼-in. intervals in such a manner that every stitch is locked independently of the others. Consequently, stitching cannot "run" if one or more stitches are broken. Belt construction is said to prevent ply separation and reduce stretch to a

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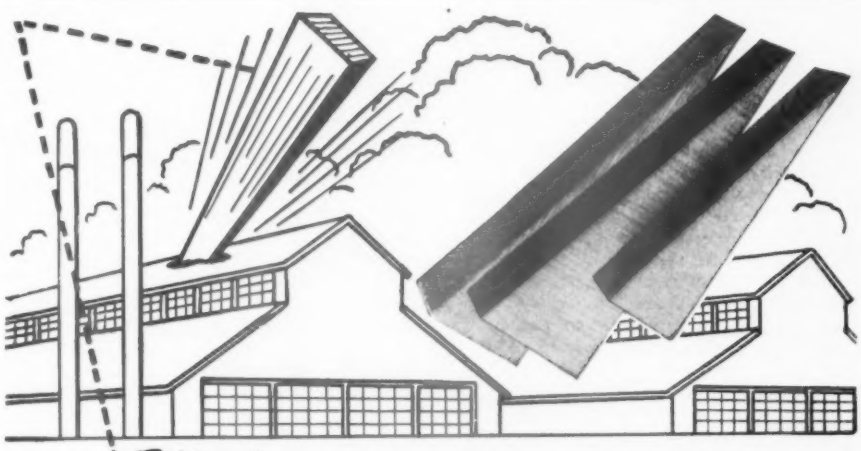

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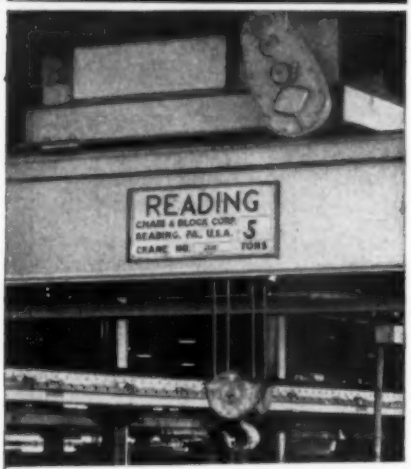

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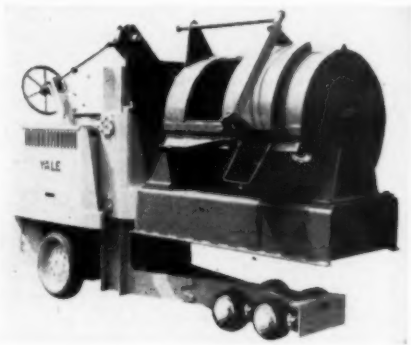
minimum. Power transmission belting is available in widths of 1 to 36 inches in 4, 5, 6, 8 and 10 ply. Other belting comes in widths 1 to 54 in., 4, 5, 6, 7, 8, 9 and 10 ply.

Ladle Truck: Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Philadelphia 24—Electric powered ladle truck is an 8000-lb high lift platform type with six steering wheels for even load distribution

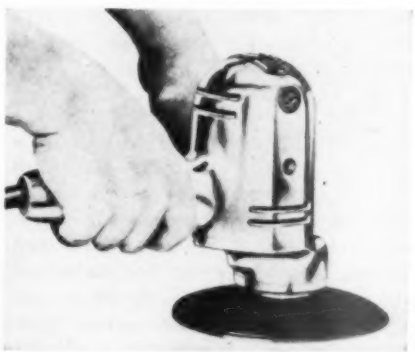


and minimum turning radius. Refractory brick-lined ladle is permanently mounted on a skid engaged by the platform of the truck and pinned thereto. Pin is disengaged only when the ladle is removed for maintenance. All truck movements, including pouring and operation of the insulated sliding door which covers the ladle inlet opening, are controlled by the operator from his position at the rear of the truck. Truck will carry 6000 lb of molten metal.

Fire Extinguisher: Ansul Chemical Co., Marinette, Wis.—Dry chemical fire extinguisher containing 2 pounds of chemical has been designed for effective use by inexperienced operators. In the small extinguisher field, it is said to provide maximum protection for flammable liquid and electrical fires. It is rechargeable on the spot after use. The dry chemical is nontoxic, a nonconductor of electricity, noncorrosive and nonabrasive. It is said not to deteriorate, solidify or evaporate and therefore does not require periodic recharging.

Battery Charger: Hertner Electric Co., 12600 Elmwood Ave., Cleveland—Automatic single-circuit motor generator battery charger for motive power batteries is furnished as a complete package unit, occupies less than 4 square feet of floor space, and is portable. All electrical connections and working parts are mounted inside a metal cabinet to prevent accidental contact with electrical equipment. Control panel is set at an angle at desk top level, providing easy reading and convenient operation. A pilot indicates when the set is on charge. It is designed to charge a lead-acid battery in 8 hr, a nickel-alkaline battery in 7 hr, and to meet specifications of the Electrical Industrial Truck Association and the recommendations of battery manufacturers.

Multipurpose Tool: Porter-Cable Machine Co., 1714 North Salina St., Syracuse 8, N. Y.—Portable electric tool is designed for grinding, polishing, drilling and cutting by a simple change of attachments. It is powered by a 115 v, ac-dc, 25-60 cycle, single-phase motor; has ⅝-in. eleven-thread spindle with ¼-in. socket in end; no-load speed of 3000 rpm and normal load speed of 2000 rpm. Overall dimensions are 7⅜ in. high, 7 9/16 in. wide and 11⅛ in. long. Net weight is 5 lb, 13 oz.



Chain Fasteners: Atlas Chain & Mfg. Co., Castor & Kensington Ave., Philadelphia 24—New roller chain fastener is a retaining ring having no dangerous points exposed. Provided with three, internal, equally spaced teeth, it is strung radially into a groove on the pin. The equal spacing of these teeth, and spring action of the connecting links, are said to assure that the ring will maintain a tight groove tension at all times. If struck a direct blow, the ring

merely turns in its groove, hugging it tightly, it is claimed. Chain disassembly with the ring may be accomplished with a screw driver.

Air Hammer: Blank Machine Tool Co., 3116 East Michigan Ave., Jackson, Mich.—Air impact hammer is adapted to many applications in

metal working shops because of its variable power and speed. In this hammer the stroke is constant and impact pressure may be varied precisely from 2800 lb to 40,000 lb or up to maximum capacity. A common 100-lb pressure line is all that is necessary, and air consumption is 1 cu ft for 15 strokes. Speed of operation by hand or foot is approximately 60 strokes per minute.

Slings: Palmer-Shile Co., 16033 Fullerton Ave., Detroit 27—Wire rope slings of plow steel have, at each

end, a 6-in. loop spliced in and sewed with tape. The wires are of six strands, 37 wires to the strand. Slings are manufactured in four ⅛-in. rope diameters from ⅜ to ¾-in. in standard 6-ft lengths with extra lengths supplied to customer's specifications.

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EFFECT OF PARTICLE SIZE DISTRIBUTION ON MOLDING SAND

(*Continued from page* 71)

from the same mixture of each composite sand.

1. Green permeability—The relation between sand additions and green permeability as listed in Table V is presented in Fig. 6. As the percentage of added sand fractions increased the green permeability increased in all mixtures. The 40 per cent addition of the No. 100 sieve fraction gave the highest value for green permeability, 32.2, compared with the value of 10.1 for the basic Albany sand. It is of interest, however, to note that all mixtures containing additions of the No. 100 fraction were more effective in raising the green permeability than those containing equivalent additions of either the Nos. 50 or 200 fraction. This would seem to indicate that there is some critical size of particle which exercises a maximum influence on this property.

Although it is generally conceded that finer particles decrease a sand's permeability, it will be noted that the permeability, nevertheless, is increased by the increasing amounts of the No. 200 sieve fractions. In all instances, however, the added sieve fractions decreased the relatively high percentage (33.5) of subsieve particles in the basic Albany sand and thereby reduced the clogging effect of these subsieve particles.

2. Green strength—The relation between sand additions and green compressive and tensile strength as listed in Table V are shown in Figs. 9 and 10. The mixtures containing 40 per cent of the No. 100 addition gave the lowest values for green compressive strength, 3.2, and green tensile strength, 4.0, compared with 8.2 and 7.7, respectively, for the Albany sand. The compressive and tensile strengths steadily decreased in all mixtures for each increasing addition of sieve fractions. The additions of the No. 100 fraction generally produced lower values in both strengths than equivalent additions of either Nos. 50 or 200 fraction.

3. Relationship between subsieve particles and physical properties—In Fig. 8, the percentage of subsieve particles has been plotted against green compressive and green tensile strengths. Examination of these curves shows that a decrease in the content of the subsieve particles by any one of the three added sieve fractions resulted in a consistent increase in green permeability and decrease in green compressive and tensile strengths. However, the magnitude of the effect on the physical properties differed for different sieve fractions. In general the greatest effect was produced by the additions of the No. 100 sieve fraction.

4. Relationship between distribution indices and physical properties—A relationship was found to exist between the physical properties and the distribution indexes for all sand mixtures used in the investigation. As the distribution indexes increased, the green permeability values increased and the green strength values decreased. The mixtures containing No. 100 additions had the highest distribution indexes. Correspondingly, the green permeability of these mixtures was greater and the green strength was generally lower than those of the other mixtures, i.e. mixtures containing Nos. 50 and 200 additions.

5. Correlation between physical properties and cumulative curve—With the additions of single narrow fractions, the cumulative curves were badly distorted, especially for the higher percentage additions of the sieve fractions. This prevented any general application of the concepts of sorting coefficient, skewness and skewness coefficient, as discussed by Trask[7] and Morey and Taylor,[8] and their correlation with physical properties.

Summary of Results—

1. The fine sand grains were more effective than the coarse grains in influencing the green permeability and green strength of a molding sand.

2. The additions of 10, 20, and 40 per cent of Nos. 50, 100, and 200 sieve fractions of a washed silica sand to a fine Albany sand resulted in reduction of green strength and an increase in green permeability. The

TABLE V—Test Results on Albany Sand and Its Mixtures

Test	Albany Sand	—No. 50 Addition— 10%	20%	40%	—No. 100 Addition— 10%	20%	40%	—No. 200 Addition— 10%	20%	40%
Moisture, per cent ...	5.7	5.8	6.2	6.2	6.0	5.9	5.8	5.9	6.0	5.9
Green Permeability ..	10.1	12.6	13.6	26.4	13.2	21.1	32.2	13.0	15.1	21.3
Green Compression Strength, lb/in²	8.2	6.6	5.7	3.4	7.0	4.6	3.2	7.6	5.6	3.5
Green Tensile Strength, oz/in²	7.7	7.1	6.8	4.7	6.4	4.8	4.0	6.5	5.6	4.5

amount of change in each instance was roughly proportional to the amount added.

3. In all cases, the additions of 10, 20, and 40 per cent of Nos. 50, 100, and 200 sieve fractions caused a decrease in the percentages of subsieve particles and an increase in the distribution indexes (implying retention of the highest total percentages of sand on five adjacent sieves).

4. In all instances, as the content of subsieve particles decreased and the distribution indexes increased, the green permeability values increased and the green strength values decreased.

5. Additions of the No. 100 fraction generally caused lower green strength and higher permeability as well as lower percentages of subsieve particles and higher values in distribution indexes than equivalent additions of either the Nos. 50 or 200 fraction.

Acknowledgment is made to Emily E. Mitchell for some of the preliminary experiment work, to Vernon C. F. Holm and Jack H. Schaum for suggestions, to Richard C. Rohan for the preparation of the graphs and the New Jersey Silica Sand Co. and Whitehead Brothers Co. for supplying some of the silica sand used in the investigation.

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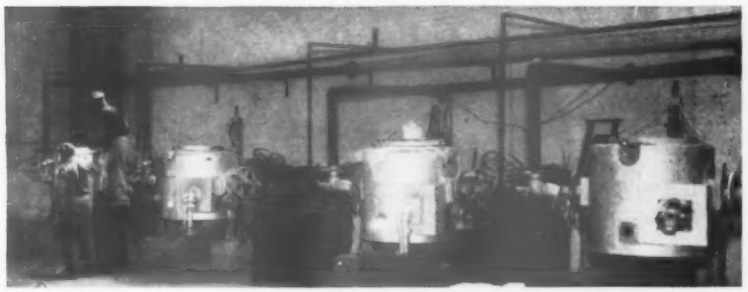
Belle City Prepares Employees Handbook

An attractive and informative handbook of information recently was prepared by the Belle City Malleable Iron Co., Racine, Wis., for its employees and those of the Racine Steel Casting Co. Entitled "Things You Need to Know About Your Job," it effectively combines information on employment policies, plant services, insurance and compensation plans and recreational activities, together with a description of the company's history, its products and manufacturing methods.



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GRINDING: Norton Co., 1 New Bond St., Worcester 6, Mass.—Illustrated pocket-size booklet discusses the field of rough grinding in foundries, welding, forge and machine shops. Its 48 pages contain chapters on the selection and evaluation of wheels, computation of grinding costs, a discussion of wheel shapes and tables of speeds.

SAFETY FILMS: National Safety Council, 20 North Wacker Dr., Chicago 6—Booklet entitled "National Directory of Safety Films' lists 403 motion pictures and slidefilms, both silent and sound, for safety education within business and industry, on the farm, in homes and schools and on the street and highways. It is classified and indexed, with film synopsis, type, source and availability for purchase, rental or loan, and costs 25 cents.

MACHINING DATA: Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y.—Booklet 29, "How to Machine Meehanite Castings," presents machining data of various types of Meehanite castings, divided according to the type of machine tool on which the operation is performed. Its purpose is to be useful as a set-up guide and gives exact details as to feeds, speeds, depths of cut, type of tool, etc.

INVESTMENT CASTINGS: Allis-Chalmers Mfg. Co., 1126 South 70th St., Milwaukee 1—Bulletin 19B6451A deals with precision investment casting and suggests its use as a means of cutting production costs when screw machine work, die castings or sand castings prove impractical or expensive. Sample parts are illustrated.

TRANSFORMERS: Lindberg Engineering Co., 2453 West Hubbard St., Chicago 12—Bulletin 1110 covers applications, design and construction of standard dry type transformers and transformers for special applications. Wiring diagrams for the various type transformers are included.

METAL DOORS: Cornell Iron Works Inc., 36th Ave. & Thirteenth St., Long Island City 1, N. Y.—Catalog describes rolling steel doors, fire doors and grilles made of aluminum, bronze and stainless steel. The automatic operation of these doors also is discussed.

INDUSTRIAL DIAMONDS: Anton Smit & Co., 333 West 52nd St., New York 19—Circular 7 contains suggestions for selecting the proper diamond tools as well as important points for the proper and most efficient use of diamond tools.

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PALLET TRUCK: Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24—Illustrated folder contains specifications and operational data on the company's model M25HP electric lift pallet truck.

STANDARD SPECIALTIES: International Nickel Co., 67 Wall St., New York 5—Booklet lists about 200 standard products for corrosive and high temperature service made of Monel, nickel or Inconel and available from stock or from standard designs. Among the items described are balls, floats, nails, bolts, pickling slings and hooks, thermostat parts, thermocouple protection tubes, pipe and pipe fittings, gaskets, valves, cathodes, grease fittings, tags, woodruff keys, wire rope and vibration isolators.

BLASTING NOZZLES: Mills Alloys Inc., 11320 South Alameda, Los Angeles—Catalog describes company's line of blasting nozzles with tungsten carbide liners. Additional booklets deal with use of the nozzles in the following industries: Sand blasting, foundry and heat treating, glass and monument decorating, building cleaning, railroad and shipyard maintenance and cleaning.

STEEL CHAIN: S. G. Taylor Chain Co., Box 509, Hammond, Ind.—Booklet on the company's alloy steel chain contains a check list of things to look for when inspecting chain; factors that enter into and govern the proper use of chain; a suggested plan for chain maintenance; a table giving the maximum wear limits for each diameter of chain; the safe working load limits of each size of chain and correct chain repairing methods.

MOTORS: Allis-Chalmers, 1126 South 70th St., Milwaukee—Bulletin 05B6107A describes motors of 1 hp or larger for driving powerhouse auxiliaries. It provides data on types and characteristics of the company's induction motors, construction details of standard open type motors, special features for open type motors, and totally-enclosed fan-cooled motors. Motor selection chart is included.

CONCRETE: Lumnite Division, Universal Atlas Cement Co., 135 East 42nd St., New York 17—Booklet describes corrosion and heat resistant concrete for floors and for lining stacks, oil refinery vessels and drainage systems. Basic information about the product is offered and a section is devoted to placing and finishing corrosion-resistant floors.

UNIT HEATERS: Young Radiator Co., 709 Marquette St., Racine, Wis.—Catalog 6548 describes the company's complete new line of cabinet unit heaters. Tables covering capacities and dimensions are included.

OIL CONVERTER: North American Mfg. Co., 4455 East 71st St., Cleveland 5—Bulletin 2605 describes a conversion unit which may be attached to a gas burner, permitting oil or gas to be burned in that burner upon a moment's notice at the turn of a lever.

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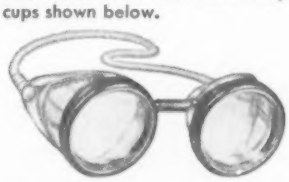
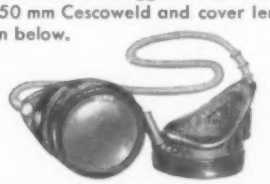


CESCO Welders Goggles—No. 545-W with 50 mm Cescoweld and cover lenses shown below.



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AIR TOOL CHART: Buckeye Tools Corp., 29 West Apple St., Dayton 1, O.—Chart, compiled from tests made under typical operating conditions, points out the power loss and consequent loss of air tool productivity caused by the use of incorrect air hose and couplings. Correct application of air power equipment is suggested.

WELDING EQUIPMENT: Victor Equipment Co., 844 Folsom St., San Francisco 7—Catalog 20-B illustrates a large portion of the company's line of gas welding and flame cutting apparatus. Complete descriptive data are given on all items and a welding tip selection chart is included.

MAGNETS: Magnetic Engineering & Mfg. Co., Van Houten Ave. & Erie Railroad, Clifton, N. J.—Catalog 448 gives operating data, dimensions and ratings of lifting magnets which are built in both the all-welded and bolted types in all sizes. Magnetic separators also are illustrated.

CONVEYORS: Link-Belt Co., 307 North Michigan Ave., Chicago 1—Booklet 2330 pictures a variety of actual installations of the company's overhead trolley conveyors. Adaptability of this type of conveyor for handling many types of products is described.

INSTRUMENTS: Taylor Instrument Companies, P. O. Box 110, Rochester 1, N. Y.—Bulletin 98170 describes briefly the companies' entire industrial instrument line. The field of application of each type of instrument is covered as well as its principle of operation and range limits.

METAL MARKING: Metal Marker Mfg. Co., 1384 East 40th St., Cleveland—Booklet discusses the importance of proper product identification. It illustrates a number of mold inserts, roll dies, steel hobs, punch press and insert stamps.

OVENS: Young Brothers Co., 6500 Mack Ave., Detroit 7—Bulletin 8-S gives information on laboratory and standard cabinet ovens for electric, gas or steam heat. It also illustrates a group of special cabinet ovens which are adaptable for a variety of processes.

CONVEYORS: Coburn-Foster Conveyor Co., 9362 South Ewing Ave., Chicago 17—Literature describes the company's line of conveyors and includes specifications and illustrations. The company's material handling service is discussed.

VALVES: Homestead Valve Mfg. Co., 11 Johnson St., Coraopolis, Pa.—Reference book 39, section 5, covering the company's lubricated plug valves, offers general catalog data, descriptions, specifications and prices on the units, parts and accessories.

TEMPERATURE INDICATORS: Tempil Corp., 132 West 22nd St., New York 11—Folder describes crayon, pellet and liquid type compounds which, when applied to metals being heated, melt at a predetermined temperature.

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Pressure Cast
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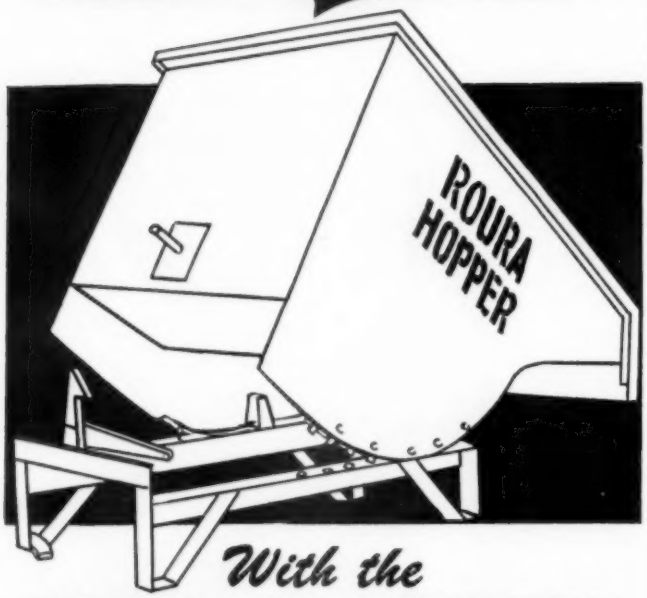

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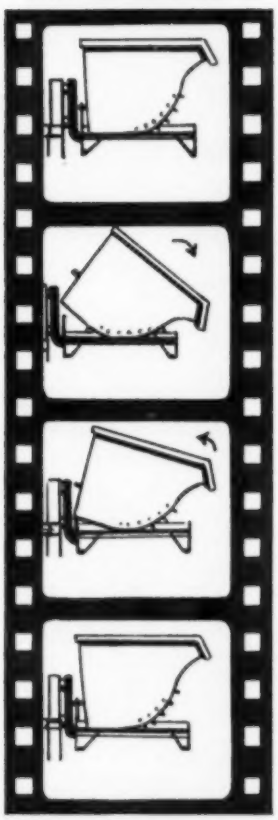
ROURA *self-dumping* HOPPER



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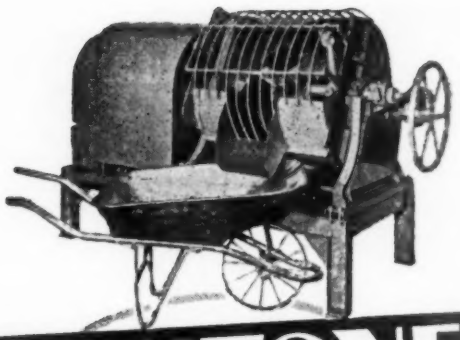

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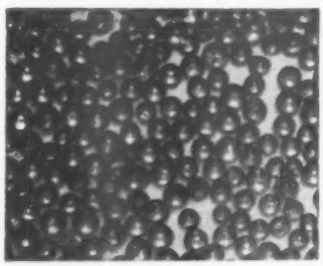

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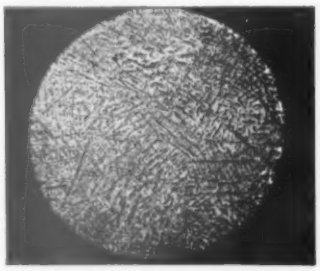

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in wide use in the British Commonwealth, European and Scandinavian countries.

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"Based on experience, our fuel cost has been reduced at least 40%, operation charges are down by 50%, fire has to be charged and trimmed only 2 or 3 times daily, depending on the amount of metal. The quality of melted metal delivered is better, owing to the impossibility of fume contamination.

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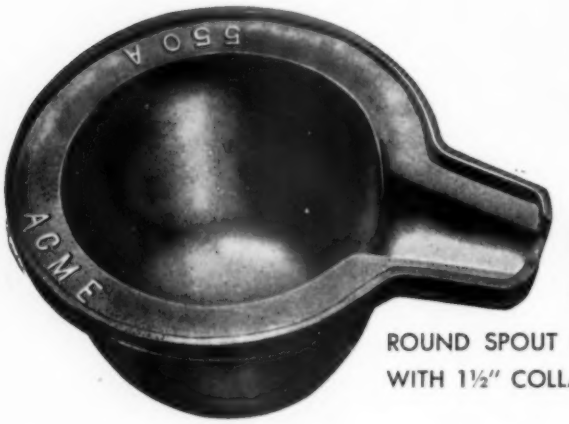

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WITH 1½" COLLAR ON FLANGE

INGOT MOLD NO. AA-6

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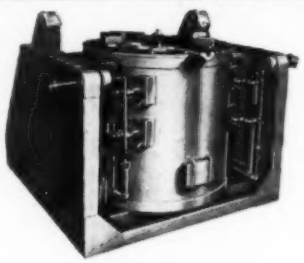
NON-FERROUS METAL MELTING FURNACES

SELECTION TABLE

	TYPE	Max. Temp.	Series	Recommended for	Bulletin No.
TILTING	CRUCIBLE	2500°F.	TCR	Melting Brass and Copper	TC-45
		1400°F.	TCA	Melting Aluminum	TC-45
	POT	1400°F.	TP	Melting Aluminum and Magnesium	TP-45
STATIONARY	CRUCIBLE	2500°F.	CR	Melting Brass and Copper	CR-45
		1400°F.	AC	Melting Aluminum	AC-45
	POT	1400°F.	AM	Melting Aluminum	AM-45
		1200°F.	SM	Melting Soft Metals	AM-45
		1000°F.	SA SAV	Melting Soft Metals	SV-45

26348



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ONE NAME MEANS MOST

For the Cleanest Castings—"EXCELLO"—Proudest Product of BLOOMSBURY GRAPHITE CO., BLOOMSBURY, N. J.

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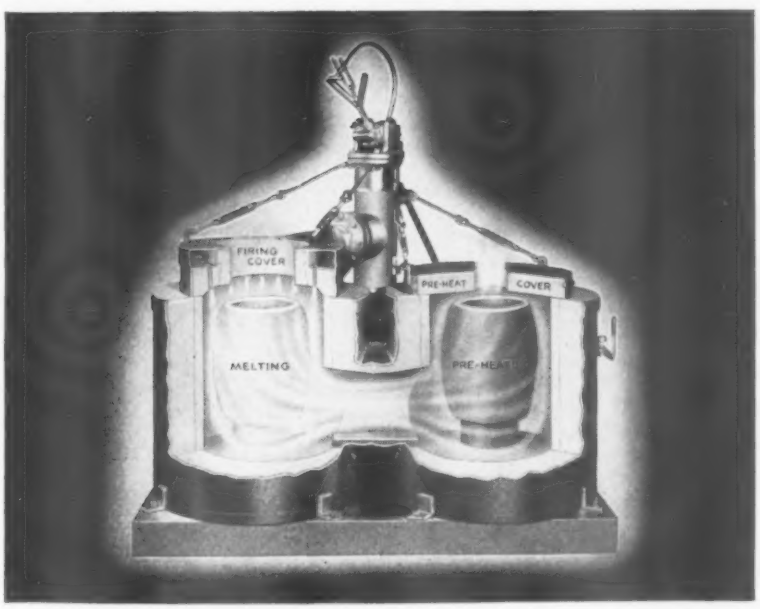

The Randall-Twin crucible furnace, while melting one pot, preheats a second by using the heat that is wasted in a furnace of conventional design. You save space, fuel, reduce melting time, lower crucible wear and get a better metal.

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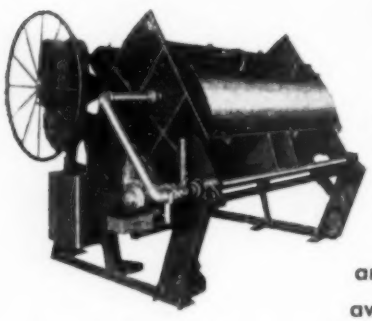

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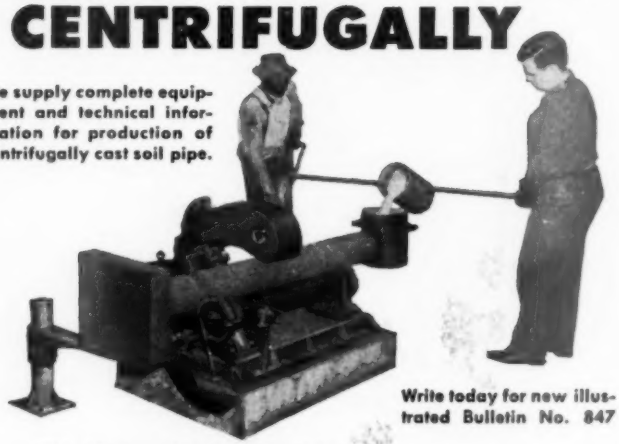

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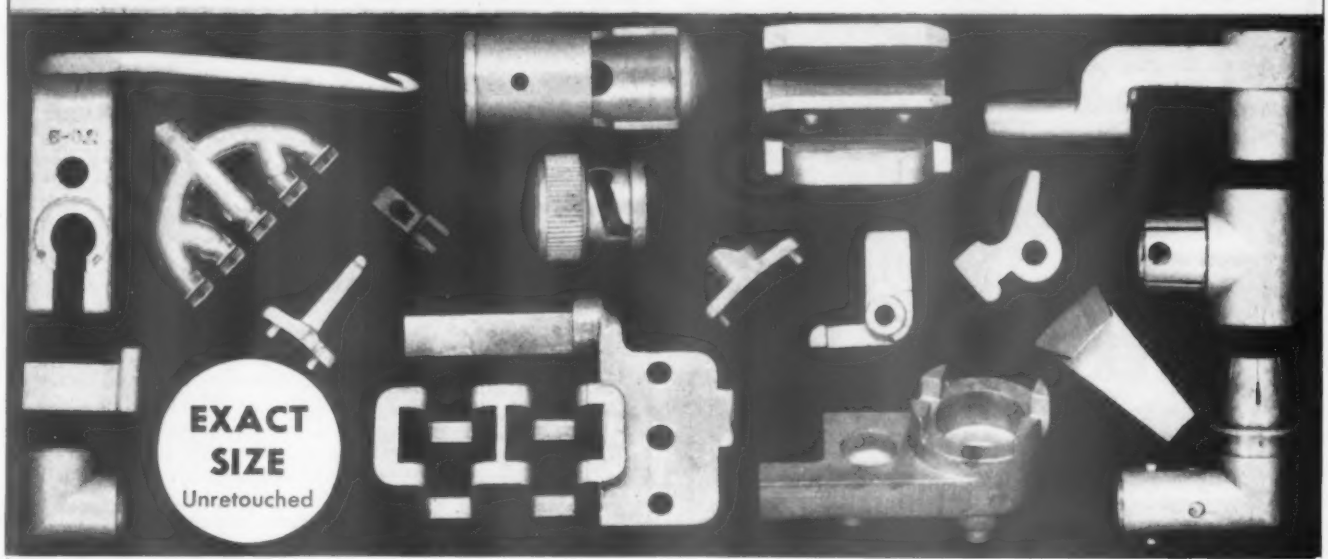

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NO. 4 DAYTON RING VALVE BENCH RAMMER

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Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

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MURPHY PISTOL SPRAYER
ELIMINATES SWAB, BRUSH and SPRAY CAN

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PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
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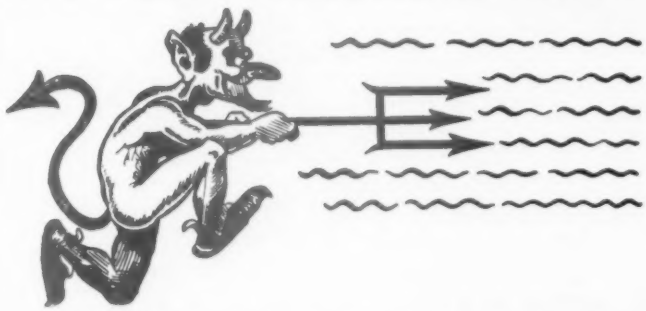
(Patents Pending)

Now Waterproofed—Will Not Absorb Moisture Even in Green Sand Molds
★ For Ferrous and Non-Ferrous Metals ★



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THERMOTOMIC WP is used as ring inserts under risers or feeding heads where its exothermic action serves to raise the temperature of the feeding metal thus assuring adequate feeding while the casting cools and solidifies. In this manner, pipe and shrink cavities caused by premature freezing of the feeding metal are eliminated. THERMOTOMIC WP readily lends itself to many other applications. It is used as facing inserts or as a facing application in molds where it is desirable to maintain the metal in a liquid state for an extended period of time; in gate cores or strainer cores, and at the juncture of light sections with heavy sections to equalize the rate of solidification of the metal, thus preventing internal strains or shrink cracks. After having burned out, THERMOTOMIC WP retains its original shape and becomes a refractory insulator. Because of reduced riser dimensions and the restricted feeding neck of one or one and one-half inches made possible by the use of THERMOTOMIC WP, tremendous savings are realized through increased yield and reduced cleaning costs.

A large steel foundry reported a saving of $1075 on 50 castings in using THERMOTOMIC.

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SOFFEL'S NO. 5 CARBON FREE LIQUIDIZER
An Exothermic Feeding Head Compound and Pipe Eliminator

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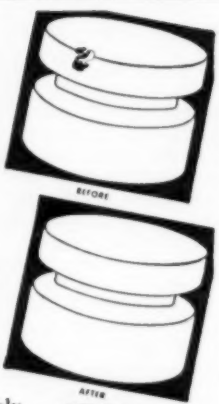
For Surface Blemishes in ALUMINUM CASTINGS



Have you used the Smooth-On Foundry Cement made especially to correct blow holes, porous and rough spots, dents and other unsightly but harmless surface defects in otherwise sound *aluminum* alloy castings?

Applied the same way as the widely used Smooth-On *Iron* Foundry Cement, Smooth-On No. 8 *Aluminum* Cement fills in evenly, hardens quickly, matches perfectly. Stays in place, too, for it expands slightly as it sets.

Smooth-On No. 8 Aluminum Cement comes in 1-and 5-lb. sizes. 1 lb. will fill 17 cu. in. Order it by NAME AND NUMBER from your supply house. If they haven't it, write us. If you have not yet discovered Smooth-On No. 8, ask us for

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No. 8 ALUMINUM CEMENT

AMAZING VIBROLATOR

QUIET — SPRINGLESS — SELF-STARTING

GUARANTEED— Not to jam, stick or fail to start
PROVED— In the world's most modern foundries
EXCLUSIVE— Self lubricated feature needs no oil or attention
GREATEST— Power for weight ratio of any vibrator
BEST— All-directional vibrator ever built
CUTS COSTS— Saves time out for repairs, saves air
IMPROVES— draw because it is light in weight, has better balance
MARVELOUS— Self cleaning feature ejects water, sand, scale and muck

IMMEDIATE DELIVERY—ORDER NOW!

Order one size smaller than conventional vibrators
⅜", $7.00; ½", $9.00; ⅝", $11.00; ¾", $13.00; 1", $15.00; 10 CV, $17.50; 10 MV, $17.50.

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AMASTEEL
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LASTS MANY TIMES LONGER

Here is the peak efficiency in shot for BLAST CLEANING and PEENING.

AMASTEEL is much better than hard iron or malleable abrasives.

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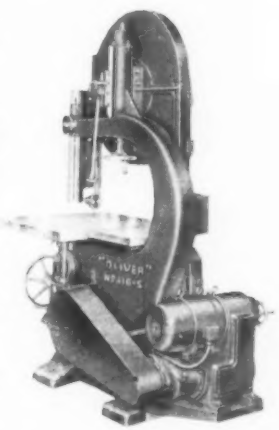
ALLOY METAL ABRASIVE CO.
311 WEST HURON ST. ANN ARBOR, MICH.

"OLIVER"
30-inch Metal Cutting
BAND SAW

Cuts risers, gates, sprues, heavy or light sections of metals, sheet metals, compositions, wood

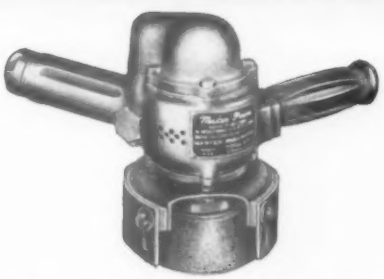
A powerful Band Saw—the finest of its size built. Cuts true, steady, smooth. Has low speed geared head direct connected to lower wheel for cutting heavy cross sections. Also furnished with high speed motor for sawing woods, compositions, sheet metals. Also available in 18", 36", and 38" sizes.



Write for Bulletin No. 217-S

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

Master Power
HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES ★ SERVICE ★ STOCK ★ COAST TO COAST

WHERE FOUNDRY DUSTS OR FUMES ENDANGER HEALTH

here's comfortable, approved breathing safety!

M·S·A "Comfo"

METAL FUME

RESPIRATOR

Harmful metal fumes are filtered effectively from inhaled air by this specifically-designed respirator. Large-area twin filters are especially processed for maximum efficiency, protected by sturdy aluminum containers—Comfo Cushion Facepiece assures gas-tight fit on any face without binding. U. S. Bureau of Mines approved. Bulletin No. CR-17.

M·S·A Clear-Vue

DUSTFOE

RESPIRATOR

Compact, light in weight, built for hard service, the popular Clear-Vue Dustfoe Respirator is welcomed by the foundryman for its top wearing comfort as well as complete All-Dusts respiratory protection. Formable aluminum facepiece with flexible cushion enables individual shaping to the face — transparent plastic filter container shows filter condition without disassembly — inexpensive filters are readily replaceable as needed. U. S. Bureau of Mines approved. Write for Bulletin CM-8.

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STS. · PITTSBURGH 8, PA.

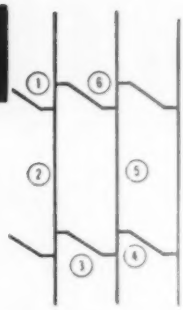
District Representatives in Principal Cities

In Canada:

MINE SAFETY APPLIANCES COMPANY OF CANADA LIMITED, TORONTO

Montreal . . . Vancouver . . . Calgary . . . Winnipeg . . . New Glasgow, N.S.

7 STAVES INTERLOCK



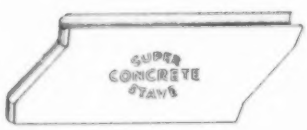
Each Super-Concrete Stave in a Neff & Fry Silo interlocks with six contiguous ones. The edges are grooved and beaded. The joints are so secure that grouting is not necessary, although a mastic filler is used when damp-proofing is specified.

Due to the diagonal joints, reinforcing rods impinge upon both ends of all staves. As many additional rods are drawn around the bodies of the staves as needed to resist lateral pressure.

This patented design makes the N & F Silo a structure of distinctive strength and solidity. The corrosion-resistant materials assure long life with virtually no maintenance cost.

It will pay you to get complete information. Write, wire, or phone.

THE NEFF & FRY CO., Camden, Ohio



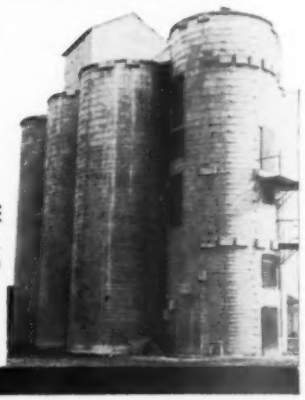
NEFF & FRY

SUPER-CONCRETE STAVE

STORAGE BINS

FOR ALL SORTS OF

FLOWABLE BULK MATERIALS



QUICKDRAW

FOR PERFECT

CORES

In Less Time!

Invented by Myron C. Kline

No special setup or rigging necessary to produce uniform, true-to-size, handmade cores with a Quikdraw Core Machine. Lightens the coremaker's work, eliminates undersized, patched-up jobs. Small wonder why more than half our orders are repeaters from satisfied users. Write for further information.

STRATTON MANUFACTURING CO., ERIE, PA.

Control Equipment needn't be costly—

look at these prices

With the Dietert Carbon Determinator, you can get carbon content of metals to an accuracy of one-half point in two minutes. Other materials having up to 60% carbon are tested with comparable accuracy.

The PRICE is $235.00

The sulfur content of metals and other materials can be just as accurately obtained by the Dietert Sulfur Determinator in three minutes.

The PRICE is $153.00

The Dietert Varitemp Furnace used in the combustion of samples for carbon and sulfur determination develops temperatures under close control up to 2750° F.

The PRICE is $228.00

Zircotube combustion tubes have especially long service life and even at temperatures of 2800° F. they do not crack, sag or become porous. They resist thermal shock and metal splatter.

Dietert Combustion Boats likewise are highly refractory, resist metal shock and metal penetration.

The PRICE is $49.00 a thousand

5202

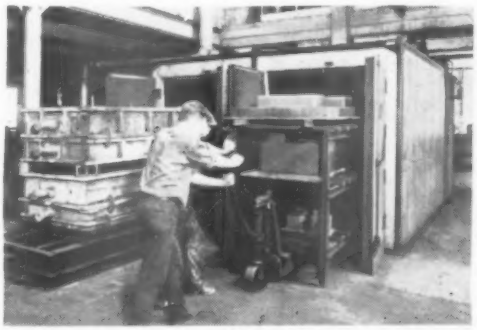
Write to Department 7 for complete specifications.

Harry W. DIETERT Company

9330 Roselawn Ave. Detroit 4, Michigan

CONTROL EQUIPMENT • SAND • MOLD • MOISTURE • CARBON • SULFUR

GEHNRICH Two-Compt. Oven for Cores & Molds Oil-Fired Recirculating Convection Heated



Bake Cores More Uniformly More Thoroughly – Faster

Baking in Gehnrich Ovens at controlled temperature with large volume heat circulation produces more uniform, stronger cores and molds. Aluminized steel insulated, dual panel, no through metal oven construction plus recirculating convection heating, oil or gas firing with fully automatic temperature, heat and ventilation protective equipment, are combined to make the best you can get in ovens at any price anywhere. Hundreds in use prove their merit.

GEHNRICH CORE & MOLD OVENS

Standard batch ovens are made in all sizes for any loads. Conveyor types designed for special needs. Catalog 113 on request. We also build ovens and furnaces for annealing, normalizing, finishing and metal melting. Catalogs on request.

W. S. ROCKWELL COMPANY

Batch and Continuous Ovens and Furnaces

210 Eliot Street • Fairfield, Conn.

In Canada: Francis Hankin & Co., Ltd. Montreal & Toronto

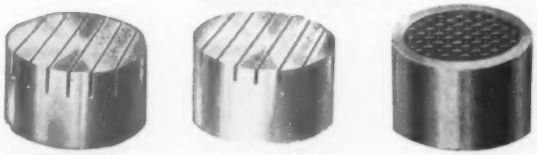
SERVING the FOUNDRY

SMILLIE

A SPECIFIC TYPE FOR EVERY CORE BOX

CORE BOX VENTS

SLOTTED OR SCREEN



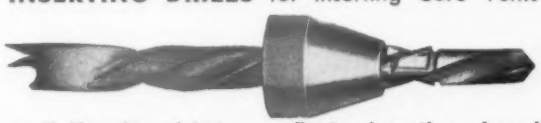
DEEP HEAD Wide or Narrow Slots .014 .010

SHALLOW HEAD Wide or Narrow Slots .014 .010

MESH .035

We stock sizes from ⅛" to 1¼" dia. in 1/16" steps.

INSERTING DRILLS for inserting Core Vents



• Uniformity of holes • Faster insertion of vent • Correct Depth

VENT CLEANER for cleaning slots

MADE OF TEMPERED STEEL, EASY TO USE

C. M. SMILLIE & CO.

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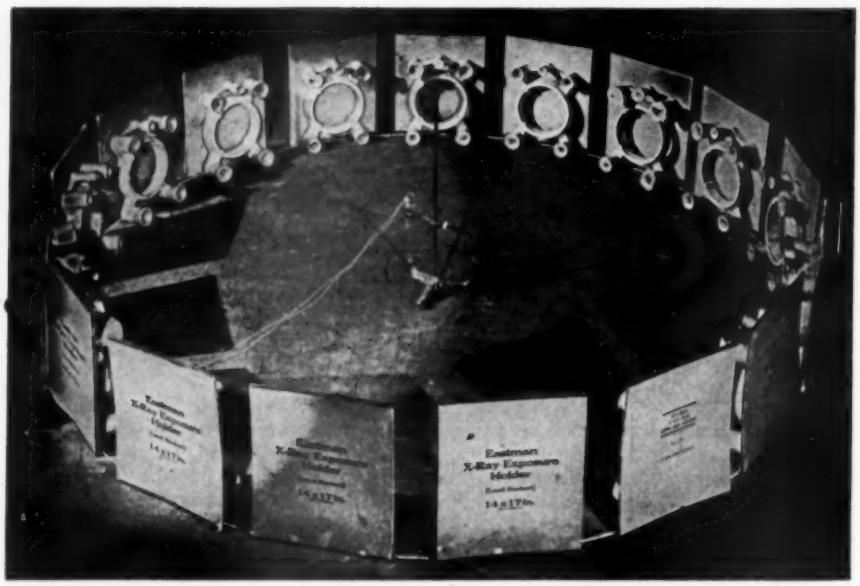
RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION



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Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicated the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance; heavy load storage containers and slide rule exposure calculators.

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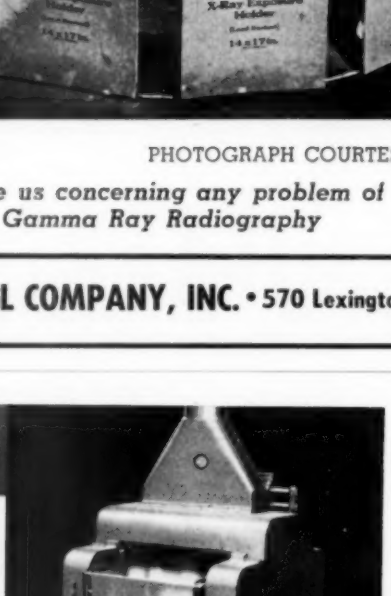
THE *NEW*

LOW-PRICED BUSS No. 208 SINGLE SURFACE WOOD PLANER

Capacity 20" x 8"



One of a complete line of single and double surface wood planers — all built by planer specialists.

PERFECT **FOR PATTERN SHOPS**

Here's a planer that is big enough to handle practically anything you'll want to plane (capacity 20" wide x 8" thick); that will give you absolute accuracy and do the job in jig time; that's thoroughly complete, including sectional infeed roll, sectional chipbreaker, 4 driven rolls, fully enclosed motors, knife grinding-jointing attachment; available in various rates of feed and built to give you trouble-free service — all at an amazingly low price. There never has been a wood planer that so completely fills the needs of the modern pattern shop. Write for complete details.

BUSS PLANER SPECIALISTS.
250 EIGHTH ST.
MACHINE WORKS HOLLAND, MICHIGAN

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BRING RESULTS!

- Do you need a superintendent, foreman, metallurgist, electric furnace man, core room foreman, pattern maker, cupola expert?
- Have you some used equipment which should be turned into cash?
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CLASSIFIED ADVERTISING SERVICE
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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card.

1. Combustion

Cities Service Oil Co.—20-page illustrated bulletin No. A-801 is entitled "Combustion Control for Industry." Use of Cities Service industrial Heat Prover for checking efficiency of any furnace using any type of fuel is discussed. Data are included on various phases of combustion control.

2. Welding & Cutting

Marquette Mfg. Co.—60-page illustrated set of catalogs contains specifications and detailed descriptions of complete lines of oxyacetylene welding and cutting equipment, electric arc welders of both alternating and direct current types, welding accessories, electrodes and rods, and brazing materials.

3. Industrial Furnaces

Denver Fire Clay Co.—28-page illustrated catalog gives details of complete line of industrial furnaces which includes forging, heat treating, melting, assaying, laboratory and testing types. Also covered is line of pottery kilns.

4. Manufacturing Facilities

R. C. Mahon Co.—42-page illustrated tabloid size catalog "What We Produce . . . How We Produce It . . . Our Capacity To Service Industry" covers various products and services, scope of operations and capacity of company to serve industry and commerce. Two new and modern plants and seven divisions of the company are described.

5. Overhead Conveyor

Smith Power Transmission Co.—4-page illustrated bulletin No. 551 lists specifications and shows operating principle of Flexoid overhead trolley conveyor which is designed for easy installation and can be adjusted for any desired speed of operation and trolley spacing.

6. Paint Spray Booths

Schmieg Industries Inc.—12-page illustrated bulletin No. 480 describes Centri-Merge spray booths for elimination of paint overspray by means of stream of air traveling from work through curtain of water. Typical plant layouts and installations are shown.

7. Temperature Indicators

Tempil Corp.—6-page illustrated folder No. 848 describes Tempilstik crayon, Tempil pellets and Tempilaq liquid for determining specified temperatures in welding, cutting, tempering, forging, casting, molding, drawing and straightening operations.

8. Lubrication Equipment

Stewart-Warner Corp., Alemite Div. — 48-page illustrated catalog "Industrial Lubrication Equipment" provides 'barrel-to-bearing' selection guide. Pictorial presentation of publication will aid buyers to select correct lubricants and equipment for almost every requirement.

9. Magnetic Concave Rolls

Dings Magnetic Separator Co.— Illustrated data sheet No. B-1003A provides information on high intensity electromagnetic concave rolls for high speed handling of steel and iron pipe, rod, sections and angles. Rolls are mounted to form conveyor line with first roll powered and rest magnetic idler rolls.

10. Materials Handling

Barrett-Cravens Co.—88-page illustrated catalog No. 487 shows and describes lift trucks, skids, boxes, stacking frames, die tables, hoists, elevators, cranes, storage racks, barrel trucks, dollies and other types of materials handling equipment.

11. Abrasive Blast Finishing

Pangborn Corp.—6-page illustrated folder No. 1400 presents details of operation of Hydro-Finish cabinets for impact blasting using abrasive suspended in liquid which is delivered to blasting nozzle by means of circulating pump.

12. Gas Fired Furnaces

American Gas Furnace Co.—200-page illustrated spiral-bound booklet No. 605 provides technical data on blowers and burners, furnace burners, forges, oven furnaces, pot furnaces, melters, heat-treating furnaces, automatic quench tanks, tube furnaces, cylindrical furnaces and accessories of complete line of gas-fired equipment.

13. Aluminum Alloy Casting

Aluminum Co. of America—142-page illustrated booklet "Casting Alcoa Alloys" discusses aluminum ingot products, choice of materials for various uses, types of casting alloys, design of aluminum alloy castings, foundry considerations, general foundry principles and heat treatment.

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14. Cupola Blowers

Spencer Turbine Co.—4-page illustrated bulletin No. 112B presents operating and application data on Spencer multi-stage Turbo-Compressors for foundry cupola service. Chart tabulates air requirements for standard sizes of cupolas and lists required blower horsepower.

15. Cleaning Process

American Wheelabrator & Equipment Corp.—10-page illustrated bulletin No. 354 describes Wheelabrating as the fastest metal cleaning process available. The Airless Wheelabrator throws maximum amount of abrasive, and any type of finish from fine to coarse can be produced by utilization of proper abrasive.

16. Lifting Magnets

Magnetic Engineering & Mfg. Co.—8-page illustrated catalog No. 448 reveals information on line of Memco lifting magnets in range of sizes from 12 to 65 inches in diameter. Units are available in two types having either welded magnet coil spool and pole shoes or removable coil which is bolted into position.

17. Sling Chains

Cleveland Chain & Mfg. Co.—4-page illustrated bulletin No. SC-48 lists recommended load limits, presents safety rules and gives specifications of single and double-sling chains. Suggestions for inspection, use and maintenance are given.

18. Rotary Files

American Swiss File & Tool Co.—6-page illustrated folder shows and gives prices and dimensions of complete line of hand-cut and ground-from-solid rotary files.

19. Heavy Duty Gloves

American Optical Co., Safety Div.—2-page folder S-7179 describes type No. 5X264 heavy duty industrial glove which is designed for handling small castings, rough stock, grinding work and other operations. Canvas back, elastic strap, steel sewed seams and chrome tanned cowhide wear surfaces are features.

20. Mobile Crane

Orton Crane & Shovel Co.—16-page illustrated catalog No. 73-A covers operating advantages of one-man Aero-Crane which is available in seven models ranging in capacity from 3500 to 50,000 pounds at 12-foot radius. All can be mounted on four or six-wheel chassis and furnished with diesel or gasoline engine power.

21. Industrial Furnaces

Surface Combustion Corp.—4-page illustrated bulletin No. SC-140 describes both batch and continuous types of radiant tube-heated malleableizing furnaces. Controlled atmospheres protect castings, and radiant tubes assure efficient control during heating and cooling operations.

22. Pneumatic Controls

Leeds & Northrup Co.—24-page illustrated catalog ND4B outlines proportional action, automatic droop correction and stabilized rate action of air-actuated control system. In addition, complete line of controllers, round chart or strip-chart models, Speedomax temperature regulating units and Micromax systems are covered.

23. Metal Band Saw

DoAll Co.—2-page illustrated bulletin "Low Cost Utility Band Saws for Every Purpose" gives specifications of these machines for all types of metal cutting operations as well as for filing, polishing, etc. Features of machines are explained.

24. Match Plates

Accurate Match Plate Co.—8-page illustrated bulletin explains service of company in supplying match plates, cope and drag sets, core box castings, and white metal and aluminum pattern castings. Typical parts produced are shown.

25. Blast Shot

Alloy Metal Abrasive Co.—4-page illustrated bulletin No. 125 describes Amasteel alloy steel shot for blast cleaning, long life, good finish and low maintenance cost. Possible savings through use of this shot are charted.

26. Industrial Power Truck

Schwitzer-Cummins Co. — 6-page illustrated folder No. 472-D describes pallet, platform and hydraulic lift types of Load Dispatcher industrial trucks which have capacity of 3000 pounds and are powered by air-cooled gasoline engine. Entire power unit swivels to afford maneuverability.

27. High-Speed Band Saws

DoALL Co. — 8-page illustrated publication "They Cover the Field" describes complete size range of thirteen high-speed Zephyr band sawing machines. Units range from utility model weighing 425 pounds with 16-inch throat to powerful precision model weighing 5640 pounds with 60-inch throat. Standard equipment such as variable speed drive is described.

28. Materials Handling

Brummeler Steel Products Corp.—4-page bulletin illustrates various types of materials handling equipment which can be fabricated to suit any materials handling operation. Overhead conveyor racks, casting cooling boxes, parts racks, dump hoppers, pallets and maintenance trucks are shown.

29. Electronic Controls

Wheelco Instrument Co.—4-page illustrated condensed catalog No. Z6500 and price list presents complete information on line of indicators, recorders and combustion safeguards. Operating principle of electronic instruments is explained.

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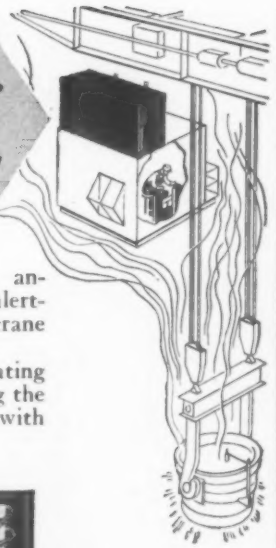
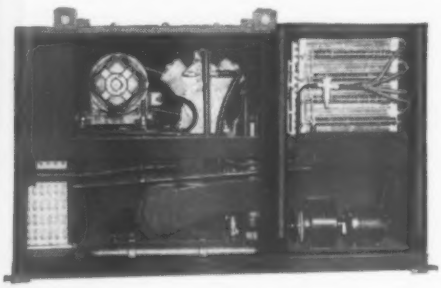
DRAVO CRANE CAB COOLERS REDUCE OPERATING HAZARDS



• Excessive heat, obnoxious fumes, annoying dust and moisture reduce the alertness and efficiency of your hot-metal crane operators.

• You can eliminate these crane operating hazards by completely air conditioning the cabs on all types of hot-metal cranes with Dravo Crane Cab Coolers.



Completely self-contained Dravo Crane Cab Cooler requires electrical connection only.

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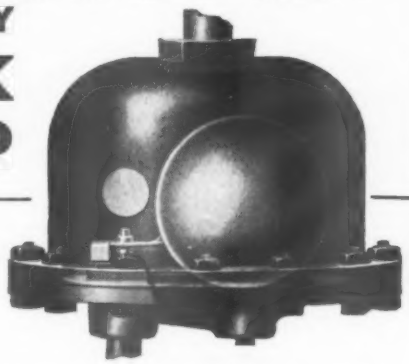
PREVENT COMPRESSED AIR STORAGE TANK EXPLOSIONS

DELIVER AIR CLEAN AND DRY . . . INSTALL A

MURPHY TANK TRAP



IT NEVER FORGETS

• Automatically removes all condensate (water and oil). Leakproof. Requires no attention, no maintenance. Install it . . . and forget it. Alternate inlets for cramped space installations. Ideal for garage, service station and similar installations. Priced within reach of the smallest compressed air user.

GUARANTEED to perform as advertised or money refunded.

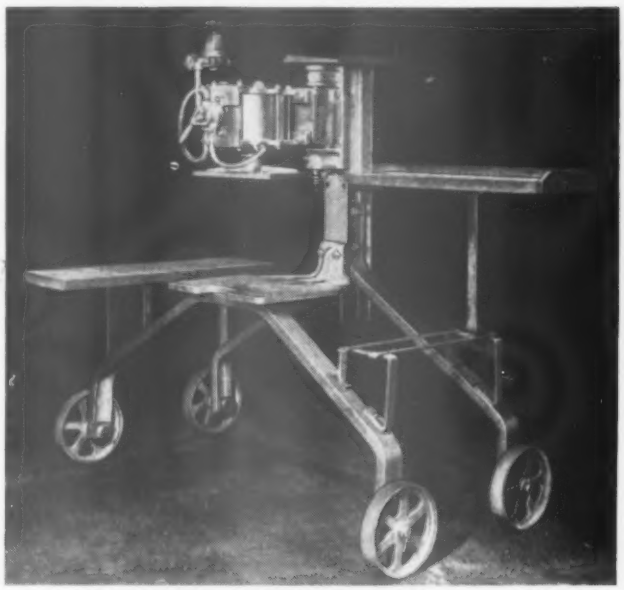
Write for literature and price.

GUARANTEED COMPRESSED AIR PRODUCTS

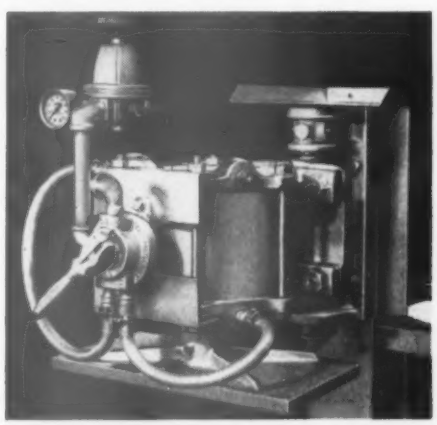
AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

GET FASTER, EASIER PRODUCTION WITH A NEW MOLINE 55 AIR SQUEEZE MOLDING MACHINE



MOLINE 55 MOLDING MACHINE WITH PNEUMATIC HANNIFIN CYLINDER



CLOSE UP VIEW OF HANNIFIN PNEUMATIC CYLINDER

The new 55 heavy duty portable features a pneumatic cylinder for smooth, full power performance. Air replaces muscle enabling a molder to put up more molds faster and with less fatigue. Larger flasks and heavier jobs can be handled more effectively. The new 55 increases production and lowers foundry costs. It is ruggedly constructed for heavy duty and designed for smooth, simple, economical operation. Molders like them!

OVER SEVENTY YEARS OF SERVICE

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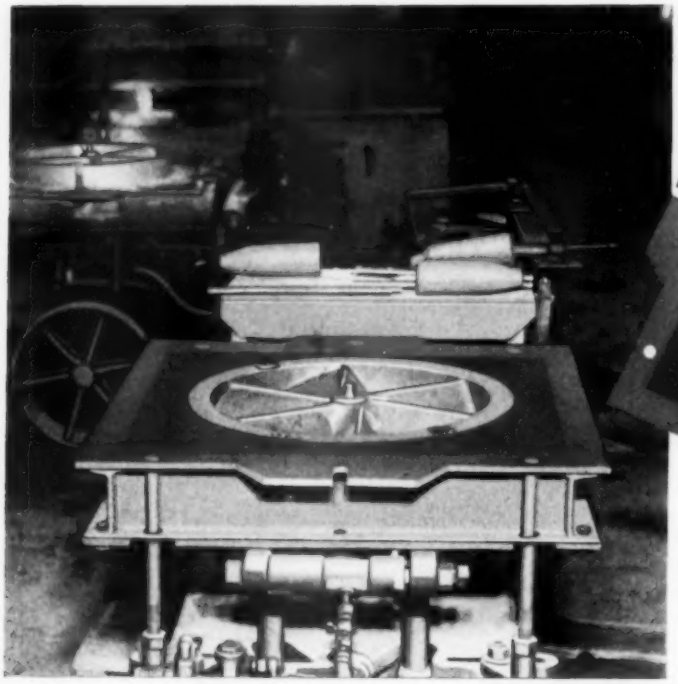
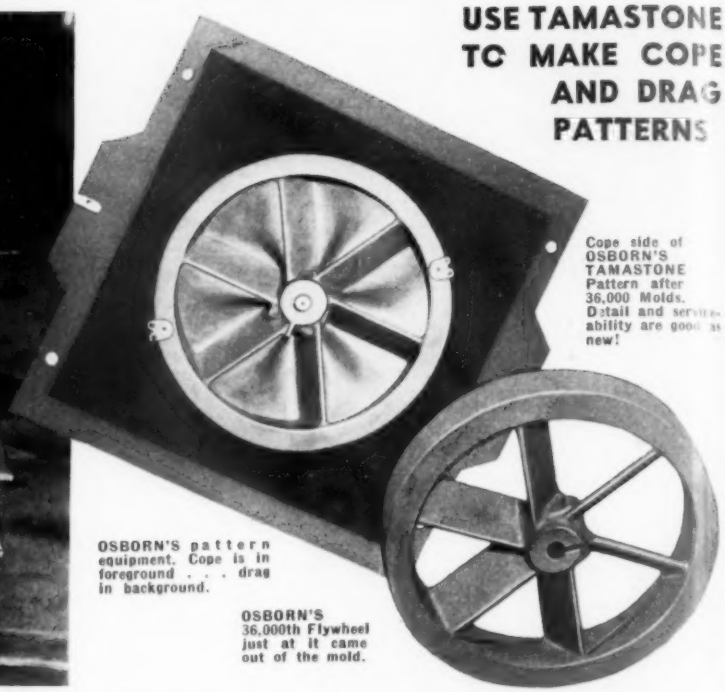
MOLINE, ILLINOIS, U. S. A.



USE TAMASTONE TO MAKE COPE AND DRAG PATTERNS



Cope side of OSBORN'S TAMASTONE Pattern after 36,000 Molds. Detail and serviceability are good as new!

OSBORN'S pattern equipment. Cope is in foreground . . . drag in background.

OSBORN'S 36,000th Flywheel just at it came out of the mold.

STILL GOING STRONG AFTER 36,000 MOLDS

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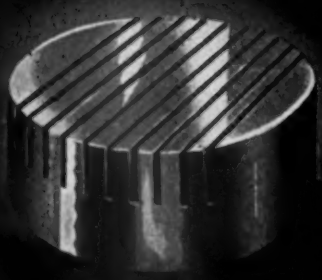

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Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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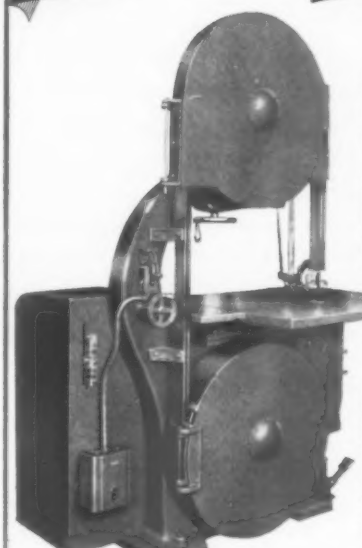

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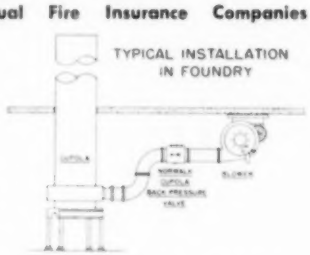

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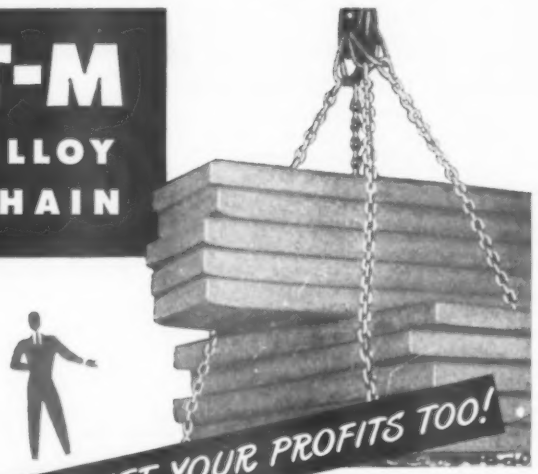

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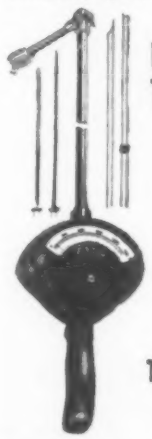

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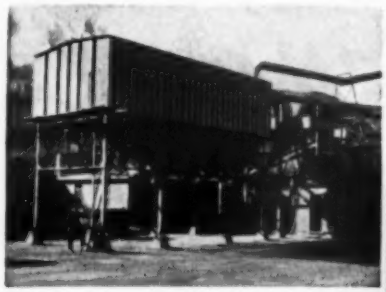

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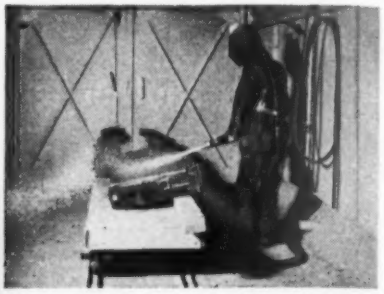

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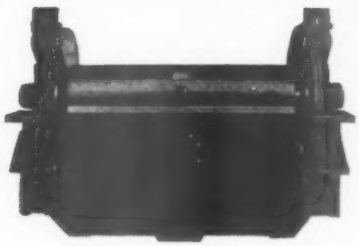

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Frontier Bronze Corp., 818 Elmwood Ave., Niagara Falls, N. Y.

ALUMINUM AND ALUMINUM ALLOYS (Cont'd.)

Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

ALUMINUM INGOTS

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., West 38th St. & NP R.R., Cleveland 13, O.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
U. S. Reduction Co., E. Chicago, Indiana.

ANNEALING BASKETS

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING BOXES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING CORES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING FURNACES (Electric)

Ajax Electrothermic Corp., Trenton, N. J.

ANNEALING POT RAPPERS

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

ANNEALING TUBES

Pressed Steel Co., Wilkes-Barre, Pa.

AERATORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

ARRESTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Gray Iron Founders Society Inc., 210 National City Bank Bldg., Cleveland 14, Ohio.

BAND SAWS

Atlantic Saw Mfg. Co., New Haven, Conn.

BAND SAWS (High Speed)

Tannewitz Works, Grand Rapids, Mich.

BAND SAWS (Variable Speed)

Tannewitz Works, Grand Rapids, Mich.

BANDS (Snap Flask)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

BARS (Steel)

Betnlehem Steel Co., Bethlehem, Pa.

BASKETS (Annealing)

Pressed Steel Co., Wilkes-Barre, P.

BATTERIES (Industrial)

Electric Storage Battery Co., Allegheny Ave. at 19th St., Philadelphia 3, Pa.

BEARINGS (Anti-Friction, Roller and Ball)

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Timken Roller Bearing Co., Canton 6, O.

BELTING (Conveyor, Elevator)

Hewitt Rubber Div. Hewitt-Robins Div., Inc., 240 Kinsington Ave., Buffalo 5, N. Y.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

BELTS (Power Transmission)

Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

BENTONITE

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Duncommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.

BINS (Storage)

American Bridge Co., Pittsburgh 19, Pa.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland 5, O.
Neff & Fry, Camden, O.

BLACKING (Mold Core)

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Frederic B., Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

BLASTING EQUIPMENT

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

BLAST METERS

Foxboro Company, Foxboro, Mass.

BLOW GUNS

U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio.

BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Campbell Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.

BLOWERS (Cont'd.)

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Stroman Furnace & Engineering Co., Division of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOLTS and NUTS

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

BOND CLAY

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Ironton Fire Brick Co., Ironton, O.

BOOKS (Technical)

Penton Publishing Co., 1213 West 3rd St., Cleveland 13, O.

BOTTOM PLATES and BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.
Diamond Clamp & Flask Co., Richmond, Ind.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BOWLS and SHANKS

Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOXES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

BOXES (Tote)

Penn Iron Works, Reading, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BRAKES (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

BRICK (Refractory)

Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

BRIQUETS (Alloy)

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

BRIQUETS (Ferro Alloy)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

BRIQUETS (Silicon Carbide)

Carborundum Co., Perth Amboy, N. J.

BRIQUETING MACHINERY (Metal)

Milwaukee Foundry Equipment Co., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES

Independent Pneumatic Tool Co., Aurora, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDING and ENGINEERING SERVICE

American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
North American Mfg. Co., 445 E. 71st St., Cleveland 4, O.

BUSHINGS (Flask-Pin)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON RAISER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

CASTING MACHINES (Centrifugal)

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Centrifugal Casting Mach. Co., Tulsa, Okla.

CASTING MACHINES (Centrifugal) (Cont'd.)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTINGS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTINGS (Precision Investment)

Precision Metalsmiths, Inc., 6511 Cedar Rd. Cleveland, Ohio

CEMENT (Metallic)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.

CEREAL BINDERS

Foundry Service Co., Birmingham, Ala.
Chas. A. Krause Milling Co., S. 43rd & Burnham Sts., Milwaukee, Wis.

CERIUM METAL

Cerium Metals Corp., 522 5th Ave., New York 17, N. Y.
General Cerium Co., 1038 River Road, Edgewater, N. J.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio
Taylor Chain Co., S. G., Hammond, Ind.

CHAIN (Steel Loading)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

CHAIN (Welded and Weldless)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

CHAPLETS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chaplet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.

Chaplets (Cont'd.)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHEMICALS

Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.

CHEMISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

CHILLS

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Corp., Port Huron, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.

CHILL NAILS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
Independent Pneumatic Tool Co., Aurora, Ill.

CHROMIUM (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAMPS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CLAY (Bonding)

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

CLAY (Refractory) (Cont'd.)

Illinois Clay Products Co., Joliet, Ill.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

CLAY STORAGE BINS

Neff & Fry, Camden, O.

CLEANING COMPOUNDS (For Core Boxes, etc.)

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwuakee 4, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Eqiupment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Torit Mfg. Co., 292 Walnut, St. Paul, Minn.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

COMBUSTION EQUIPMENT

North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.

CONVEYOR DESIGN (Cont'd.)

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.

CONVEYORS (Apron)

Logan Co., 550 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyor Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

COPPER SHOT

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.
Federated Metals Div.,
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.

CORE BINDERS

American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N.Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., S 43rd & Burnham St., Milwaukee, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
U. S. Industrial Chemicals Inc. 69 East 42rd St. New York 17, N. Y.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWERS

Martin Engineering Co., Kewanee, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingnam, Ala.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.

CORE BLOWING MACHINES (Cont'd.)

International Molding Machine Co. LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Randall Foundry Equipment Corp. 4600 E. 71st St., Cleveland 5, O
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

CORE BOXES

Accurate Match Plate Co., 1847 W Carroll St., Chicago, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

CORE BOX VISES

Lehigh Foundries Inc., Easton, Pa.

CORE COLORING

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

CORE COMPOUND

Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
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THE FOUNDRY CLEVELAND 13, OHIO

MELTER, INDUCTION FURNACE

Operating supervisor for new installation located on Eastern Seaboard. Must be familiar with stainless steel melting and capable of training operating personnel. Prefer applicant with experience in centrifugal casting. Our employees know of this opening. Give full details of age, experience and education. Address: Box 357, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With experience of snap flask work to go into our foundry for one month and make suggestions that will help increase production. Address: Box 350, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For job gray iron foundry with 150 tons monthly production of light and medium heavy castings, Central Pennsylvania. Give complete details of experience, age, and salary expected. Address: Box 356, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Metallurgist capable of operating induction ferrous furnace. Location middlewest. Address: Box 218, The FOUNDRY, Cleveland 13, Ohio.

SAND AND CLAY TECHNICIAN

Man, preferably aged 30 to 35 years, college graduate with actual experience to sell clay products, etc. ferrous and nonferrous foundries New Jersey-eastern New York state territory. High grade company. State full work and personal information and salary. Replies held strictly confidential. Address: Box 389, The FOUNDRY.

CLEANING ROOM FOREMAN

Experienced foreman wanted to take charge of cleaning room in progressive Ohio gray iron foundry. Exceptional opportunity for right man. Salary and bonus. Address: Box 407, The FOUNDRY, Cleveland 13, Ohio.

REPAIR AND MAINTENANCE MAN

Familiar with large rollover, jolt pattern draw machines in grey iron foundry in Ohio, melting 20 tons per day. State age, experience and salary expected.

BOX 381
The FOUNDRY CLEVELAND 13, OHIO

FOUNDRY MILLWRIGHT

Experienced and qualified to assume responsibility of foundry maintenance department. Address: Box 379, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Grey iron foundry in industrial North Carolina requires capable man who understands all phases of foundry operation. Would prefer modest salary with profit sharing. Capacity 150 to 200 tons per month. Give us all necessary information and we will reciprocate. Address: Box 380, The FOUNDRY, Cleveland 13, Ohio.

Manufacturer's Agents

SALESMEN

Wanted for leading manufacturer of foundry equipment. Applicants must have a thorough background of foundry engineering. Must have a car for traveling purposes. Territories open nationally. Specify complete background, territory desired and remuneration. Address: Box 310, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EQUIPMENT MANUFACTURER

Interested in securing additional representation in Western Pennsylvania, Southern Ohio, Kentucky, Virginia, Texas and Louisiana. Please write: Box 270, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SALES REPRESENTATIVE

Grey iron, bronze and aluminum production castings, pattern and machine work. A-1 contacts in Detroit area. Address: Box 387, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Fast and accurate. Layout work including blueprints, estimating costs and checker. Wood and metal patterns to suit your foundry conditions. 35 years' experience including four years' molder apprentice. Fifteen years' experience in charge of job shop with 20 men. Will go anyplace. Take charge and work on bench, small shop or supervise large shop. Prefer shop where can do a day's work and not be checked for doing too much work. Address: Box 375, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT—GENERAL FOREMAN

Thirty years' practical experience on medium and heavy jobbing work. Ten years' foreman and superintendent in gray iron shop pouring 30 to 40 tons per day. Would like to make change at once. Address: Box 323, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Practical foundryman with technical training. Thirty-two years' experience, including fifteen years of supervision. Well versed in all phases of jobbing and production work on light and medium castings. Progressive and up-to-date in modern methods. Capable of taking complete charge of medium size foundry. Available on short notice. Address: Box 400, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Age 49, experienced in mechanized grey iron, automotive blocks and small parts, pipe fittings and valves, soil pipe and small jobbing castings. Engineering education, excellent labor relations, sand control and metallurgy. Married and in good health. Would consider trouble shooting on straight salary or fee basis. Address: Box 402, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

25 years' experience, patterns and castings. Dimensional quality control foundry troubleshooter. Engineering, pattern, casting and casting layout departments liaison. Address: Box 388, The FOUNDRY.

PATTERNMAKER

Widely experienced and fast patternamaker—wood or metal—charge of shop—trouble shooter—instructor. Convert apprentices into competent journeymen in two years. Address: Box 374, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Desires connection with progressive nonferrous foundry in Southwest. Capable of supervising all foundry operations including estimating and selling. Age 46, married. Have specialized last seven years in the production of aluminum sand castings. Address: Box 398, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY METALLURGIST

Experienced. Acid electric melter, low and high alloys. Capable of assuming responsibility of chemical and physical laboratories, heat treatment, sand control and gamma ray. Address: Box 383, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT OR MANAGER

Mechanical engineer with 20 years' experience in positions of top responsibility desires permanent position in modern gray iron foundry. Thoroughly familiar with bench, roll-over and blowing cores; squeezers, split pattern machines, and sand slingers and modern cupola equipment. Successful in handling cost, loss and labor relations. Address: Box 393, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN SUPERINTENDENT OR ASSISTANT

Thirty years' experience in steel. Can train molders and melters. Experienced in production of medium and heavy castings. Can rig head and gate for sound castings and for lowest cleaning cost. My record and ability can be proven for all phases of a steel foundry. Address: Box 341, THE FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 871, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Young nonferrous foundryman with 15 years' experience from molder to foreman desires position in progressive foundry with opportunity for advancement. Thoroughly experienced in all phases of foundry operations. Address: Box 394, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EQUIPMENT AND SUPPLY SALESMAN

Former foundry manager and superintendent, age 49 with sales experience, mechanical and industrial engineering education desires connection with reliable foundry equipment or supply company. Thorough knowledge of all phases of foundry practice, married, will travel. Address: Box 403, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

35 years on bench—wood and metal. First class mechanic and can make matchplates. Do metal and wood work including core blowing, rigging and driers. Address: Box 376, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD FOUNDRY ENGINEER

TWENTY-FIVE YEARS' EXPERIENCE AIRCRAFT PARTS OR ANY INTRICATE WORK. FULL OR PART TIME. OHIO AREA OR METROPOLITAN NEW YORK LOCATION PREFERRED. ADDRESS: HAROLD C. HAASE, 557 SOUTH FOREST DRIVE, WEST ENGLEWOOD, NEW JERSEY.

GRAY IRON FOUNDRYMAN

Wants to make new connection. Practical experience with technical training. Cost minded. Experienced with work ranging from a few pounds to ten ton. Good rigger for production. Understand gray iron metallurgy. Mix iron by analysis. A-1 cupola supervision. Capable of handling a foundry organization as top management, assistant to a busy executive or as a foundry superintendent. Middle age. Good personality. Address: Box 397, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURING EXECUTIVE

Presently employed, desires to make a connection with a progressive manufacturer or foundry, preferably in the East. Twenty-four years' experience in the manufacture of cast iron heating equipment and commercial gray iron castings both light and heavy. Have always held top positions such as office manager, purchasing agent, assistant superintendent and plant manager. Age 44, married and of good character. Address: Box 392, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Art, bronze or molder. High grade, experienced in all art bronze castings. Interested in position in Chicago district only. Address: Box 339, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

MAINTENANCE SUPERINTENDENT

With engineering experience on mechanized foundry technical knowledge on layout, installation and estimating on foundry equipment. Twenty years' practical experience in supervising complete maintenance in modern foundry operation. Desire change. Address: Box 361, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY CONSULTANT

Estimating of casting weights furnished by return mail. Accurate reliable service. Nominal fee. Send blue prints to: CHAS. E. ROLAND, ITASCA, ILL.

OPEN HEARTH SUPERINTENDENT OR MELTING FOREMAN

Thirty years' experience making all kinds of steel for castings or ingots, basic or acid. Familiar with construction and operation of furnaces. Can furnish very best of references. Address: Box 354, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT GENERAL FOREMAN

Twenty-five years' practical experience with ten years as molder and 15 years as foreman and superintendent of both jobbing and productive shop on castings up to 20 ton. Well versed in all departments including cupola, mixing metal, rigging and gating for fast production and best quality castings. Cost minded and can handle men. Address: Box 390, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT AND PRODUCTION MANAGER

Manganese steel foundry. Familiar with all phases of manganese steel production. Have worked with electric furnace, am expert in sand mixing and machine molding and have high percentage of good castings. Excellent references. Address: Box 343, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

20 years' foundry experience, 11 years' supervision, molding, coremaking, cupola, sand, cleaning, 4½ years' superintendent, jobbing and production, cost and quality minded. Age 44, married. Address: Box 378, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical molder and core maker with 26 years' experience as foundry superintendent. All classes of jobbing, rollover and squeezer. Mix by analysis. At present employed. Address: Box 869, The FOUNDRY, Cleveland 13, Ohio.

COREROOM SUPERINTENDENT

Production shop preferred—automotive. Have experience and ability to handle any core room producing large or small work and operating all types of core making machinery. Have specialized in sand mixing. Address: Box 405, The FOUNDRY, Cleveland 13, Ohio.

MALLEABLE OR GRAY IRON FOUNDRY SUPERINTENDENT

20 years' experience from molder to superintendent. Now employed but wish change with reliable company. Age 37. Malleable preferred. Address: Box 404, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Practical foundryman, married, age 43. 23 years' experience in all phases of foundry operations, in iron, steel and high manganese. Have successfully operated foundry producing 70 tons daily in castings from 1 to 40,000 lbs. with low scrap loss. Have experience in plant management with record as good organizer. No reference as to location. At present employed in Mid-west. Address: Box 396, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRY MANAGER

Fourteen years' experience in all phases of foundry work, supervision and management in both production and jobbing plants. An engineering graduate well qualified to give best results in any foundry assignment, steel and high alloy. Presently employed but desires more progressive employer. Address: Box 401, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY EXECUTIVE

37 years of age—18 years in jobbing and production foundries. Industrial engineer by education, foundryman by experience. Wide experience in labor relations. Held positions from melting foreman to last four years as general manager. Address: Box 408, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

29 years' experience as electric steel foundry superintendent of jobbing and high productive shops making small to five ton castings. Midwest preferred. Address: NICK ODORISIO, 4731 HICKORY, OMAHA, NEBRASKA.

Open Capacity

Wood and metal pattern experimental and model work. Let us estimate on your pattern equipment.

CONGERVILLE PATTERN SHOP

P. O. Box 107 CONGERVILLE, ILLINOIS

Phone—DANVERS ILL. 3-317

OPEN CAPACITY

For small sand cast aluminum castings. 6 molding machines available. Good castings at reasonable prices. Send samples. ADDRESS: STANLEY ALUMINUM FOUNDRY, P.O. BOX 260, OCONTO, WISCONSIN.

OPEN CAPACITY

Gray iron foundry in Central Wisconsin equipped to handle matchplate production from 5 to 50 lbs. Quantity castings at a price in line with the present market trend. Send drawing or sample for prompt quotation. Address: NESHKORO PLOW & SLEIGH WORKS, NESHKORO, WIS.

OPEN CAPACITY

We are ready to make most all kinds of small patterns both mounted and cast plates. We will submit castings from all wood patterns for your approval. We have over thirty years' experience. Give us a trial and let's get acquainted. Address: MARTIN'S PATTERN & TOOL WORKS, ASHLAND, OHIO.

OPEN CAPACITY

Gray iron and aluminum castings. Specialize in gas burners and thin section castings. Address: INDUSTRIAL FOUNDRY & MFG. CO., SCHOOLCRAFT, MICHIGAN.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

OPEN CAPACITY

Central Pattern Works. Wood and Metal patterns. 1109 E. Pratt St., Baltimore 2, Md.

OPEN CAPACITY

Gray iron, brass and aluminum castings

STAMPINGS

Machining—Assembly—Finishing

Contract Manufacturing

Send Inquiries or Prints for Estimates

SAVANNAH MACHINE & FOUNDRY CO.
SAVANNAH, GEORGIA

Opportunities

COKE SAVINGS OF DOLLARS

per day is possible in nearly every foundry—reduction of total time of heat—resulting in quality metal. Get our report on your cupola. Semisteel is the purest—strongest—hottest metal made in cupola. Are you making it? Our system is an investment that brings returns worth many times the fee. Distance is no bar and remember you don't wade thru hundreds of pages only to learn the information has no bearing on the making of quality castings or how to keep your losses down. Advice is concise and a real treat for every man connected with the foundry. Information free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE. MILWAUKEE, WIS.

OPPORTUNITY

We can furnish at any point slack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.

OPPORTUNITIES

Want to contact parties who can manufacture and market adjustable flask clamp-telescope type which doubles itself in length. Address: GEORGE E. CARLIN, 945 N. 5th Ave., Tucson, Arizona.

Employment Service

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Foundries For Sale

FOR SALE

Nonferrous aluminum and brass foundry well established. Business building brick and tile, open span 50 x 155 and vacant 100 x 155 all fenced in. Rapidly growing city in Middlewest. Valuation of property alone $50,000.00—total price $70,000.00. Address: TULSA BRONZE WORKS, 1428 EAST 4th ST., TULSA 6, OKLAHOMA.

FOR SALE

Small jobbing shop located in Southwest. Priced to sell. For further information address: Box 395, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY—GREY IRON

Sales $20,000; Western Pennsylvania; 40 man capacity; complete foundry; brick fireproof building 16,000 square feet; core room; new cupola; storage and office buildings; 70 accounts; reputation for high grade castings; excellent steel supply; health compels sale; price reasonable.

THE APPLE CO.
BROKERS 1836 EUCLID AVE. CLEVELAND, O.

Classified Advertising

Foundries For Sale

FOR SALE

Brass, bronze and aluminum foundry full equipped. Fireproof. Also equipped for polishing. Northern Illinois. Bargain.

BOX 355

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Gray iron foundry serving South West. Tight production work. No close competition. Reasonable. Address: Box 386, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Soil pipe plant. Producing two and four inch pipe, popular fittings and other products. Will sell or lease from three to five man company. Too much for one man. Address: REED MANUFACTURING, COLBY, KANSAS. PHONE 252.

Wanted-To-Buy

WANTED
CONVEYOR

100′ steel apron feeder conveyor with or without motor and drive.

NATIONAL FOUNDRY CO.
10 SANDFORD ST. BROOKLYN 5, N. Y.
ULSTER 5-4233

WANTED

Five or six charging buckets, 54″ dia., 54″ deep, with partition and drop door hinges in center. Address: SANITARY CO. OF AMERICA, LINFIELD, PA.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

25″ to 30″ magnet—controls, generator for 220V, 3 phase. State price, condition, location, weight, etc. Address: Box 236, Martinsville, Illinois.

WANTED TO RENT OR BUY

Nonferrous foundry 5,000 to 6,000 sq. ft. in or in the vicinity of Chicago, Illinois. Address: Box 399, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Must be in good condition

Sandslinger with 8 foot hopper feed. 12, 14 or 16 foot turn table. Late model 60″ cupola. 2000 lb. mixing ladle.

ILLINOIS FOUNDRY CO.
SPRINGFIELD, ILLINOIS

FLASK WANTED

Used slip or pop-off flask size 18″ x 18″ 10″ cope 4″ drag and jackets. Address: Box 391, The FOUNDRY, Cleveland 13, Ohio.

PATTERNSHOP WANTED

Part interest or buy outright pattern shop. Capable mechanic—wood and metal and can make own matchplates and core equipment. Address: Box 377, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

Rattler and drive equipment complete. Good condition. 36″ x 60″—$350.00.

HETHERINGTON & BERNER INC.
701 KENTUCKY AVE. INDIANAPOLIS, IND.

ROTARY POSITIVE BLOWERS
IN STOCK TODAY!!!

28x30	6700 CFM	7 lbs.
20x60	6150 CFM	2 lbs.
20x30	3560 CFM	3½ lbs.
16x24	3210 CFM	5 lbs.
16x21	2125 CFM	5¾ lbs.
16x48	2430 CFM	2 lbs.
14x42	2880 CFM	2 lbs.
14x36	2190 CFM	1½ lbs.
12x18	1500 CFM	4½ lbs.
10x15	850 CFM	3½ lbs.

And many smaller Roots-Connersville and Sutorbilt Rotary Positive Blowers, Spencer—Sturtevant—North American and General Blower Turbo Blowers. Also Steel Plate Dust Exhausters.

SEND US YOUR INQUIRIES.
WM. W. MEYER & SONS
8309 NILES CENTER ROAD
SKOKIE—ILLINOIS

FOR SALE

TURBO BLOWERS

(2) 2200 cfm @ 2½ lb. Spencer Turbo Blowers with 40 HP 3 phase 60 cycle 3600 RPM totally enclosed fan cooled motors.
1675 cfm @ 2½ lb. Spencer Turbo Blower 30 HP 3 phase 60 cycle 3600 RPM totally enclosed fan cooled.
1400 cfm @ 16 oz. Spencer with 220/440 volt 3 phase 60 cycle motor.
150 cfm @ 3 lb. Spencer with 5 HP 3600 RPM motor.

PRESSURE BLOWERS

2500 cfm @ 7 oz. Sturtevant with 15 HP 3/60/220/440 volt motor.
2300 cfm Clarage with 2 HP 3/60/220 volt motor.
1400 cfm @ 8 oz. Robinson with 5 HP, 3/60, 3600 RPM motor.
1100 cfm @ 16 oz. Sturtevant.
450 cfm @ 6 lb. A & B with 30 HP motor.
250 cfm @ 12 oz. GE with 2 HP motor.

THE MOTOR REPAIR & MFG. CO.
1522 HAMILTON AVENUE
CLEVELAND 14, OHIO

PIG IRON
FOR SALE
ANALYSIS

Choice of Phosphorus in range of	.70 to 2.00
Choice of Silicon in range of	2.00 to 3.50
Manganese	.40 to .80
Sulphur	.06 max.
Carbon	3.50 to 4.50

PROMPT DELIVERY. Price, $85.50 per net ton.

BOX 373
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

New number 3 cupola and skip charger complete with electronics (not erected)—slightly used number 3 root positive blower—used 30 H.P. Allis Chalmers slip ring motor with Rheostat controller and grids, good condition. Detailed specification on request. Address: Box 384, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

4—#10-D "Nicholls"

JOLT SQUEEZE MOLDING MACHINES

Priced Right

BOSTICK FOUNDRY COMPANY
LAPEER, MICHIGAN

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES

3—75J Osborn Jolt Squeeze
2—SPO #611-B Stationary, Oscillating, Jolt, Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
1—Tabor Plain Squeeze, Strain Rod Type
3—Mumford 3″ Cyl. Core Jolt, with 20″ x 15″ Table
4—Osborn #36 core box drawing machines.

BLOWERS FOR CUPOLAS AND FURNACES

6—#805 General Blowers, 5 HP, 3/60/220, 1400 CFM at 8-oz. pressure
Maxon-Premix Blowers for Gas, ½ to 1 H.P.
1—Connersville double geared rotary cupola blower, rated 24 cu. ft. per rev., maximum delivery 6200 CFM.

METAL MELTING EQUIPMENT

1—Recirculating Gas Fired Oven with all controls, suitable for Core Oven
2—Hausfeld 1000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
2—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
3—Stationary Gas Fired #60 Crucible Furnaces, with ¼ H.P. Maxon-Premix Blowers
2—Monarch-Rockwell Rotating, 500# Brass, Oil New 32″ to 41″ Dia. Shell Cupolas made to order.

TUMBLING MILLS AND SAND BLAST

2—Pangborn No. 2 GH direct pressure type sandblast barrels, motor driven. Complete units.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.

MISCELLANEOUS

4—Heavy duty flexible shaft grinders 2 HP.
30—Jib Cranes. Floor Type, 1000 to 2000 lbs. capacity, 180° swing, 10 to 15 ft. arms.
30—1000 lbs. Capacity Budget Electric Hoists.
5—Low Lift Electric Trucks, 2000 lbs. capacity and up. Riding Operator Style.
1—Heavy Duty Back Geared Sprue Cutter, 1½″ square knives, T & L Pulley Drive.
1—Fay & Egan 14″ blade revolving, double arbor, tilting table, variety saw with roller table.
Miscellaneous Electrical and Gravity Conveyor Systems.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

1—Royer Sand Separator & Blender, Model NC-2 with motor, 220 Volts—2 phase, 60 cycle.
1—Shakeout table, Type 148-A, 3′ x 7′ with 5″ vibrator and automatic oiler (New Haven make)
1—Tabor Column jar squeezer, 10″ cylinder, 18 x 20″ table.

All the above slightly used.

1—Beardsley & Piper Sand Slinger with 5 ton feeder, complete with motors and bucket conveyor.

This sand slinger is in fair condition and ready for use.

1 each Adams Snap Flasks, straight 12″ x 14″—12″ x 16″—12″ x 18″—12″ x 20″—13″ x 17″—14″ x 18″—all 5″ Copes 4″ drags, with "V" pins and ears. In original package—never used. Price reasonable.

LAFAYETTE FOUNDRY PRODUCTS CO.
2235 N. BODINE ST. PHILADELPHIA 33, PA.

BLOWER SALE

Like new manufactured by American Blower Corp. capacity 2700 cfm. Develop as much as 5 lbs. pressure. Double outboard ball bearings. Weight approximately 2000 lbs. Sale price is ridiculously low—ONLY $199.

AMERICAN WAREHOUSE
PHONE 53 BOX 1546
PUEBLO, COLORADO

FOR SALE

Used Universal tensile testing machine. Good condition. Type MP-10, motor driven, hydraulically operated. Address: Box 334, The FOUNDRY, Cleveland 13, OHIO.

Classified Advertising

For Sale

FOR SALE

1—NEW ELECTRIC LEAD MELTING FURNACE

Hoskins type FR 118 consisting of split type insulated cover—power transformer, 220 volt, 3 phase, 60 cycle primary, 73 volts secondary.

Complete automatic temperature control equipment for the above.

1—REBUILT COMPRESSOR

Serial #4529¾. Size 15 & 9¼ x 12, Class XCB-2 Air End Complete with Automatic 5 step clearance control, cylinders, piaten, rod assemblies, new style channel valves, force feed rotary drive lubricator.

Performance

Piston Displacement C.F.M.	513-586
Speed, RPM	210-240
Air Pressure, pounds	100-100
B.H.P. required	85- 97
Actual capacity, C.F.M.	432-499

The V-belt drive is complete, consisting of Compressor sheave, motor drive and necessary ropes, catalog No. 9-D-240 15.0-54.0; Compressor speed 240 RPM, Motor speed, 875 RPM, Center distance between sheave 62.3".

1—Westinghouse Induction Motor, 100 HP Ball Bearing

1—Allen Bradley #640 100 HP 220 Volt, 3 Phase, 60 Cycle Serial #352790, Semi-Automatic Starter

1—Ingersoll Rand Air Aftercooler, Size 5, Class and Symbol 28-PL-12, Operation pressure 100#

1—Air Storage Tank

LINE MATERIAL COMPANY
12th AND MADISON AVE.
SOUTH MILWAUKEE, WIS.

FOR SALE

6—International Roll Over Type REP Machines—Air Clamps—Power Roll Over complete with 1 H.P. Howell Motor, 3-60-220/440, Allen Bradley Starter with automatic cylinder control, Jones Worm Gear Speed Reducer 40-1 ratio. Capacity 24" wide x 28" long x 12" high. Price $1,000.00 each, f.o.b. our Plant.

8—International Type "J" Air Jarring Machines—5" Jolt cylinders and air controlled roll off. Table size 24 x 28 with air vibrators. Price $450.00 each, f.o.b. our Plant.

4—International Roll Over Machines Type Y.O.L.—Rolls on receiving and roll off, 20" width x 8' oil draw—Air Clamps—Allen Bradley Starter with automatic cylinder control—Allen Bradley 3 station switch. These machines used for precision core drawing. Price $1500.00 each, f.o.b. our Plant.
Photographs upon request.
These Machines are slightly used, inspected and all carry a 90 day guarantee. Will operate at our Plant on request.

STANDARD PATTERN WORKS
MACHINE DIVISION
6771 E. McNICHOLS ROAD
DETROIT 12, MICHIGAN

FOR SALE

Simpson type "O" intensive muller type mixer complete with gear reduction less motor. Roto-clones size D-8 and D-10 complete with TEFC motors. Pillar cranes "Shaw Box" type SSJ, 4000#. Address: PLANT EQUIPMENT CO., CINCINNATI 14, OHIO.

FOR SALE
CRUCIBLES

Approximately 70 of size 400 and approximately 100 of size 225 tercod crucibles, like new. Very reasonable. Also approximately 1000 #77 graphite stoppers like new. Address: SIBLEY IRON & METAL CO., 3400 KENILWORTH AVE., BLADENSBURG, MARYLAND.

For Sale

FOR SALE

Moore-Lectromelt arc furnace
500# capacity—type D—size 6
Complete with 4600V primary transformer, operating panel and controls—good operating condition.

Arc Furnace—200# capacity—twin electrode—single phase—hand operated—complete with 115 volt reactance transformer and control panel.

Transformer—Allis-Chalmers
750 KVA 11,500 volt primary
480 volt secondary with taps—excellent condition.

PIONEER ALLOY PRODUCTS CO., INC.
16601 EUCLID AVE. CLEVELAND 12, OHIO
KE 1030

FOR SALE

AMERICAN WHEELABRATOR—Late Model
Tumblast type—27 x 36
Dust Collectors
Late Model Sandslinger
We Invite Your Inquiries on all foundry equipment.

BALCHER MACHINERY SALES
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1186

FOR SALE

3—Allis Chalmers, centrifugal type, Turbo blowers. 12000 CFM, 16 oz. Complete with 75 HP motors. Used approximately 6 months. Price, rebuilt and guaranteed $1100.00 each, F.O.B. Joliet, Illinois.

1—Maxon blower, 1200 CFM, 16 oz. pressure. Complete with 10 HP motor. Price, rebuilt and guaranteed $225.00 F.O.B., Joliet, Illinois.

WM. KECK'S SONS
201 N. BLUFF ST.
JOLIET, ILLINOIS

FOR SALE

Baker-Perkins batch type "Unidor" core sand mixer Size 16½ type DIM complete with starter, 30 H.P. motor and oil meter.

Slightly used—Excellent condition

Immediate Delivery

GREAT LAKES FOUNDRY SAND CO.
720 UNITED ARTISTS BLDG.
DETROIT 26, MICH.

GOOD USED EQUIPMENT

Sly Dust Collecting System, consisting of 3 Sly #62 Dust Filters to handle 15,000 CFM each. Motors 220/440 volt, 3 phase, 60 cycle. Was erected, but not used.

2—Chicago Pneumatic Air Compressors, 225 CFM capacity, 100# pressure, 2 stage.

6—ton Northern, 46' span, 2 motor, 230 volt Bridge Crane. Rope floor controlled.

10—ton Shaw, 39'6" span, 3 motor, cage controlled, 230 volt DC Bridge Crane.

50 KW, General Electric Motor Generator Set.

10 HP, P&H, ball bearing Crane Motor, 230 volts DC, 675 RPM.

60 HP Westinghouse, Type SK, compound wound, 230 Volt DC Motor, 680 RPM.

IRA C. JORDAN,
2508 EAST BELLEVIEW PLACE,
MILWAUKEE 11, WISCONSIN

FOUNDRY EQUIPMENT

1—Model 30 B. & P. Speedmullor

8—275J Osborn Jolt Squeezers

1—American Rod Cutter, Size D

2—Model "S" B. & P. Screenarators

1—Gardner-Denver Air Compressor, 130 cu. ft. actual—V-belt drive with motor.
Demmler Core Blowers, size #1 & #2

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

For Sale

FOUNDRY EQUIPMENT OFFERED FOR SALE

MOULDING MACHINES—

8—Adams Model 191—20" x 16" flask bed-knee operated vibrator—8" piston—32" between rods—purchased 1936.
2—Arcade hand—Model 2-38.—purchased 1945.
1—Tabor—Micromatic draw — 2 vibrators—22" portable shockless jar rollover—purchased 1945.
5—Johnston & Jennings Model 815—2 cylinder rollover, 1 oil cylinder control for pattern draw of 15"—purchased 1945-1946.
6—International R-hand rollover jolt and draw core machines—10" x 12" table—8" draw—purchased 1936-1939.
1—Russcore double core type—¾" vibrators—2 blow guns—draw 16"—purchased 1946.
2—Davenport #34 jolt rollover and draw—30" x 30" table one vibrator—air operated.

MISCELLANEOUS—

1—Sand separator and blender, Royer portable belt type—30" pulley, centers—15" wide.
1—Testing machine—Buffalo 500 lb. capacity—purchased 1928. For testing transverse strength of standard test bars.
1—Core blowing machine—Demmler Model 55—purchased 1946.
1—Pangborn blast cleaning booth complete—7½' x 7½' x 7½' booth, Model 33.
Dust collector system Model 523—purchased 1941.
1—Pangborn #2 blast cleaning barrel, Type G.D.I. #6286 barrel 30" dia., 40" long.
1—Pangborn 4' blast cleaning rotary table.
125 sets of steel flask 31" x 41" x 7"—good condition.
Address inquiries to Mr. W. A. Messick, Plant Engineering Dept.

SERVEL, INC.
EVANSVILLE 20, IND.

FOR SALE

One Herman 2500# rollover with five ton bumper. Address: WASHINGTON FILLMORE FOUNDRY, INC., 153 FILLMORE AVE., BUFFALO, N. Y.

LIST OF EQUIPMENT FOR SALE

2—#2 Simpson Mixers with and without loader, all have motors.
16—J-275 Osborn Jolt Squeezers.
1—Model "AA" Sand Cutter.
1—Schramm Air Compressor, direct drive, 20 H. motor.
4—JDP Jolt Strippers.
5—"G" International 20 x 8 Rollover Machines.
4—Beardsley & Piper Screenarators.
1—Jeffrey Screenarator.
1—"Jr." Royer.
1—"B" Royer.
1—Swing Grinder, 5 H. Motor.
2—No. 1 Demmler core blowers.
2—No. 2 Demmler core blowers.
1—Tabor, air jolt, hand roll, 18 x 18, rollover machine.
1—Freeman core mixer complete with motor and switches.
1—American Wheelabrator 40 x 40 barrel.
2—Grinding Stands with 3 H. motor, V-belt drive, mounted on back of grinder, made by Hammond Machine Co.
1—#30 Beardsley & Piper Speedmuller with loading bucket and all motors and switches.
1—Blower—North American make, direct drive, G. & E. 5 HP. motor, 575 C.F.Ms., 20 oz. pressure.
1—Federal Electric Riddle.
4—Combs Electric Riddles.
1—Type "D" American Rod Straightener & cutter, Serial #86, air driven, it will cut off up to ⅝" rod and straighten up to 1".
3—Flexible Jarvis Grinders.
2—Practically new, Timken Roller Bearing Ladles, made by Modern Equipment Co., Ladle Bowl 40 x 42.
1—Small Timken Roller Bearing Ladle, made by same company, 800 lb. capacity.
1—Lot of Ferro Silicon) This is
1—Lot of Ferro Manganese) crushed
1—Lot of Chrome) material.
15—50 lb. sacks of Ferro Silica.
3—Shakeout Vibrators.
And many other articles too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

Classified Advertising

For Sale

FOR SALE

1—#2 American Gas Furnace, Elizabeth, N. J. Annealing.
43—Sterling Steel Flasks, 10 x 20 x 5½ x 5½
6—#1 Johnson & Jennings Moulding Machines, Serial #1159-2870 Serial #1159-2866 Serial #1159-2862 Serial #1159-2861 Serial #1159-2860 Serial #1159-2863
1—#2 Johnson & Jennings Moulding Machine Serial #1003-3171—Never Used
1—Electric Oven, Federal Mfg. Co. 4 drawers max. hgt of core 2"
1—Porter Cable Wet or Dry Vertical Belt Grinder, Syracuse, N. Y., Type BG-8, Serial #7146
1—Beardsley & Piper Screenerator #BP-11812
1—Link Belt Reducer, Size T-10LH—Order H-27881-F10. Input RPM 1380, Output 10.1, Ratio 136.4, Service Factor 1. 16.5, Input H/P.
2—Spencer Turbo Compressors—420 CFM, 55 oz. 15 HP, 3 PH, 60 CYCLE, 220 Volts, 3500 RPM.
1—Besley Grinder #214, Serial #214-30061, Model 5KF, 405 FPI, Type KF, 220/440 Volts, 3 PH, 60 Cy. Speed F.L. 1170, 25 HP.
5—Adams Slip Flasks, 18 x 18 x 4 x 5
3—Hines Flasks 10 x 20 x 4 x 4—Pop-Off
7—Tabor 12" x 2-10" Squeeze Cylinder Machines, Squeeze & Jolt Squeeze
1—Pangborn Airless Rotoblast Table. Steel Shot Cleaning Machine 6', ½ Type LG, 9", Serial #6LG9-43 with motors as follows: Elevator 1½ HP 1200 RPM, Spider with 12 auxiliary tables with vari speed, Pulley @ 3 to 1 ratio. 1 Rev. in 3 minutes to 1 Rev. in 1 minute.
1—Brownie Lift Truck, 108" Lift, Model FHLT 3000. No. F1132, Berry Motor Car Co.
1—Fordson Tractor

NATIONAL FOUNDRY COMPANY OF NEW YORK, INC.
10 SANDFORD STREET
BROOKLYN 5, NEW YORK

FOR SALE

One only Model 404 Clearfield sand mixer, complete with master gearhead motor and starter. 220 volt, 3 phase, 60 cycle, AC. Has had little use. Good condition. Address: THE ASHLAND MALLEABLE IRON COMPANY, ASHLAND, OHIO.

FOR SALE
CLEANING EQUIPMENT

Pangborn No. 3 type GH-1 blast cleaning barrel—compressed air type, complete, ready for operation, in very good condition. Address: The Multiplex Machinery Co., Elmore, Ohio.

For Sale

FOR SALE

The following International Molding Machines Like new—still in original crates
1—Jolt pin lift molding machine 1200# x 8" type JPD
2—Jolt rollover molding machines 20" x 8" type HD-G. These machines can be inspected at our plant and immediate shipment made.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PA.

WHEELABRATOR FOR SALE

WHEELABRATOR TUMBLAST
27" x 36" Serial #A47676
New 1943

WALTER H. MEYER MACHY. & EQUIP.
605 W. WASHINGTON BLVD. CHICAGO 6, ILL.

FOR SALE

LANLY RACK TYPE OIL-FIRED TO ACCOMMODATE TWO 4' x 6' x 6' RACKS. OVERALL SIZE 13' WIDE x 8' DEEP x 12' HIGH. CAN BE CONVERTED FOR GAS-FIRING. ADDRESS: BOX 406, THE FOUNDRY, CLEVELAND 13, OHIO.

FOR SALE

3—#125-175 hand tilt oil fired Stroman furnaces with blower and motor. 4—Type J centrifugal vertical molding machines. Address: ERTEL MACHINE CO., INC., 2045 MARTINDALE AVE., INDIANAPOLIS 7, IND.

FOR SALE

2—8 ton Rotary Air Hoists.
1—6' Simpson Muller & Loader with new wheels & bottom plate.
36—Hand Ladle Shanks—New.
2—Slag Buggies—New.
2—1 ton Buggy Ladles.
1—36" x 60" Floor Jolt Machines.
1—Roots Blower #6 20" x 70" 38.5 Displacement. Excellent Condition.
1—New Haven Direct Pressure 48 Barrel complete with Drive 7½ H.P. Motor 3-60-220.
2—30" Dia. x 52 large Sly Tumbling Barrels.
2—24" Dia. x 64 large Sly Tumbling Barrels.
1—Square Tumbling Barrel 40 x 40 x 23" deep.

TAYLOR & CO., INC.
680 MORGAN AVE. BROOKLYN 22, N. Y.
EVERGREEN 8-2630

FOR SALE

Two slightly used centrifugal machines at half price and one dilatometer. ADDRESS: GERLINGER EQUIPMENT, INC., MILWAUKEE, WIS.

For Sale

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: The Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

FOR SALE

1—#50 Demmler core blowing machine with 6 x 8" sand magazine extension. This machine as good as new has never been in production. Available for immediate delivery. Address: Box 385, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Mahr 8' x 13' x 6' oil fired recirculating type car bottom furnace complete with car mover and control equipment. F.O.B. our plant $2500.00. Address: Box 382, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

MOLDING MACHINES—
5—Tabor Split Pattern Jolt Squeeze Air operated.
6—Yoke type powered squeeze, flask lift, split pattern "Tabor" molding machines with 13" cylinder, open end head, for 13 x 18 flask.
1—Osborn #42, portable coremachine.
2—Tabor 10" Special Shockless Jar Squeezer, (end. brg. mch.)
2—Yoke type jar squeeze, 10" cylinder, 18 x 18 table, "Tabor" molding machine.

FURNACES
Furnace, elec. heat treat. "Electric Furnace Co." 14' L x 6' w x 6' hi. 250 KW—220 V complete with controls.
Furnace, heat treat "Industrial-Circ Air" gas fired car type, 14' L x 6'6" w x 6' hi., complete.
Furnace, annealing - continuous, "Industrial Heating" 26'6" x 6' w x 16" hi., gas fired, complete.
4—Furnaces, melting "Bellevue" 550# capacity.
1—Furnace, reverb, 33,000#, "Industrial Heating" oil fired—rebuilt in 1941.
Furnace, reverb, 8000#, oil fired.
Blower "American" #6V with motor.
Monarch 300# Crucible Tilting Furnace, with mechanism less motor.
10—Bohn Oil Fired Brass melting furnaces, pit type, for No. 80 crucible.

MISCELLANEOUS EQUIPMENT
3—"Standard" Snagging Grinders, double end, 18" wheel.
Blower, G/E low pressure 32 oz. 1600 CFM with 20-24 hp. motor 3600/3/60/440.
Motor, 25 hp. 1200/3/60/220-440—need rewinding.
286—Steel Squeezer Flasks 12" x 18" cope & drag.
463—Tabor flasks 12" x 18" cope & drag.
1—Snap Flask 10" x 20" cope & drag.
1—Snap Flask 14" x 19" cope & drag.
2—Snap Flasks 14" x 16" cope & drag.
1—Snap Flask 13¾" x 18¾" cope & drag.
1—Snap Flask 14" x 14" cope & drag.
1—Snap Flask 12" x 20" cope & drag.
1—Snap Flask 12" x 22" cope & drag.
450—Bottom Boards (wood) 12" x 18".
50—Bottom Boards (wood) 13¾" x 13¾".
50—Bottom Boards (wood) 11¾" x 21¾".
34—Squeezer Flask Uplifts.
250—Flask Weights. 12" x 18".
3 pr Crucible Tongs for No. 80 crucible.
3—Core Setting Tables (revolving).
4—Carrying Shanks for No. 80 Crucible.
"Sly" Sand Blast System 8' x 8' x 7' high with 6' turntable and exhaust system.
2—"Hausfeld" Mag-Tilt melting furnaces, 1200 lb. cap. complete.
2—Shells for Mag-Tilt melting furnaces.
Molding machine, "Arcade" portable hand draw and jolt 16" x 12" plate.
Sand blast room, "Sly" 10' x 10' compl. with tank, blower and motor.
2—Shakeout machines, "Stoney Vibrator" #D-5.
Porta trough belt conveyor, mod. 334-T 18" w x 35' l with 5 hp. motor, conveyor is mounted on two wheel truck.
Vacuum Cleaner, portable "Spencer Turbine" with 3 HP motors.
Shear, alligator type "Hendley & Whittenmore" #46 less 2 hp. motors.

BOHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG. DETROIT 26, MICH.

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

* * *

Classified advertising forms close 13th of month preceding issue.

FOR SALE

Modern Foundry Machinery and Equipment

One conveyor line of 42 pallets, each pallet of ten-ton capacity, with complete sand handling system, dust collector, return conveyor, automatic shakeouts and knockouts. Line now arranged with overhead sand distribution system for eight stations, and sand slinger with four stations.

One sand unloading system complete with track unloader, hoppers, elevator, cross conveyors, and seven steel sand storage bins.

One overhead Louden monorail core sand distribution system, complete with one electrified transporter cab and hopper and supporting steel.
One Beardsley & Piper sand slinger, track, and feed hopper, with apron conveyor. Two Ingersoll-Rand air compressors, 800 c.f.m., 1200 c.f.m.

Hoists

2 Northern HiLift, electric, two-ton
2 Northern HiLift, electric, three-ton
1 Westinghouse, electric, three-ton
1 Ingersoll-Rand "D", one ton
14 Ingersoll-Rand "D", two ton
2 Ingersoll-Rand "D6", three ton

Air Blowers

3 North American, 1300 c.f.m., 10HP motor
2 North American, 1050 c.f.m., 7.5HP motor
1 Eclipse, 250 c.f.m., 3HP motor
1 Fisher, 800 c.f.m., 7HP motor
3 Large centrifugal blowers, complete with motors and drives.

Cranes

2 Ten-ton Northern Hi Lift, 19 ft. span
7 Ten-ton Northern Hi Lift, 16 ft. 7½" span
2 Two-ton Northern, 16'7½" span
2 Two-ton Northern, 22'9" span
1 Three-ton P & H, 36'7½" span

Lift Trucks

2 Yale & Towne, 4000 lb. low elevating platform trucks
1 Yale & Towne, 4000 lb. high elevating platform truck
1 Yale & Towne, 4000 lb. high tilting fork truck
2 Yale & Towne, 6000 lb. high tilting fork truck
3 Automatic Transporter Style P 150 storage battery lift trucks

Core Blowers

1 Osborn No. 91
1 Osborn No. 92
2 Osborn No. 94

Core Ovens

1 Despatch Vertical, 47 ft.
2 Despatch Vertical, 67 ft.

Welding Equipment

1 Stone-Ryals Saw Blade Welder, Type MF 6
3 P.H. Arc Welders, 200 amp.
1 P.H. Arc Welder, 500 amp.

Dust Collectors

1 Dust collector—30HP motor
1 Rotoclone, Type D
3 Rotoclone, Type W

Grinders

5 Black & Decker—10HP
2 Hammond—7½ HP
2 Gardner #3D buffers
1 Cleveland buffer

Crucibles

5 1000 lb.
10 500 lb.

Furnaces

9 1000 lb. Fisher furnaces—type MNP (electric tilt)
4 500 lb. Fisher furnaces—type MNP (electric tilt)
6 500 lb. Monarch furnaces, type T (hand tilt)
15 500 lb. Monarch holding furnaces
4 500 lb. Holding pots
4 1800 lb. Romph furnaces
5 1000 lb. Monarch furnaces, type T (hand tilt)
2 500 lb. Bull ladles
1 6000 lb. Remelt furnaces
2 30000 lb. Remelt furnaces
Jeffery pig mold conveyor system for remelt furnaces

Molding Machines

4 Osborn Squeezer, 275 PG
2 Osborn Rollover, 602
1 Osborn Pin Lift, 712 J
6 Tabor Squeezer
1 Tabor Rollover, 40"
2 International Pin Lift, JDP
4 Osborn 405 Rollover
2 Tabor Rollover, 30"
3 Osborn 602 Rollover
11 Tabor Rollover, 22"

Sand Blast Equipment

1 Pangborn Sand Blast with Dust Collector

Saws

2 Tannewitz Band Saws—36"

Mixers

1 Simpson No. 2 Mixer
1 Beardsley & Piper Speed Muller
1 Small Simpson Mixer, ¾ HP

Storage Tanks

5 Steel sand storage tanks, 319 ton capacity
2 Steel sand storage tanks, 200 ton capacity

Complete complement of steel and aluminum flasks.
Small tools and numerous spare parts.
Pattern shop equipment.

The National Bronze and Aluminum Foundry Co.

East 45th and Hamilton Avenue

Cleveland 14, Ohio

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WAKE UP, *Mr. Foundryman!*

The New ROYER SAND CONDITIONER *gives you Completely Mechanized Sand Preparation*

No need now for nightmares on account of costly, tedious, old fashioned hand shovelling in your sand preparation. The new Royer is Self-Loading, and Self-Propelled . . . does the entire job automatically. Sand is scooped from the floor as the machine advances . . . trash and burnt cores are culled out . . . combing, blending and aerating are accurately controlled. Up to 50 tons per hour of finely textured molding sand. The new Royers are making a wonderful on-the-job record. Write for particulars.

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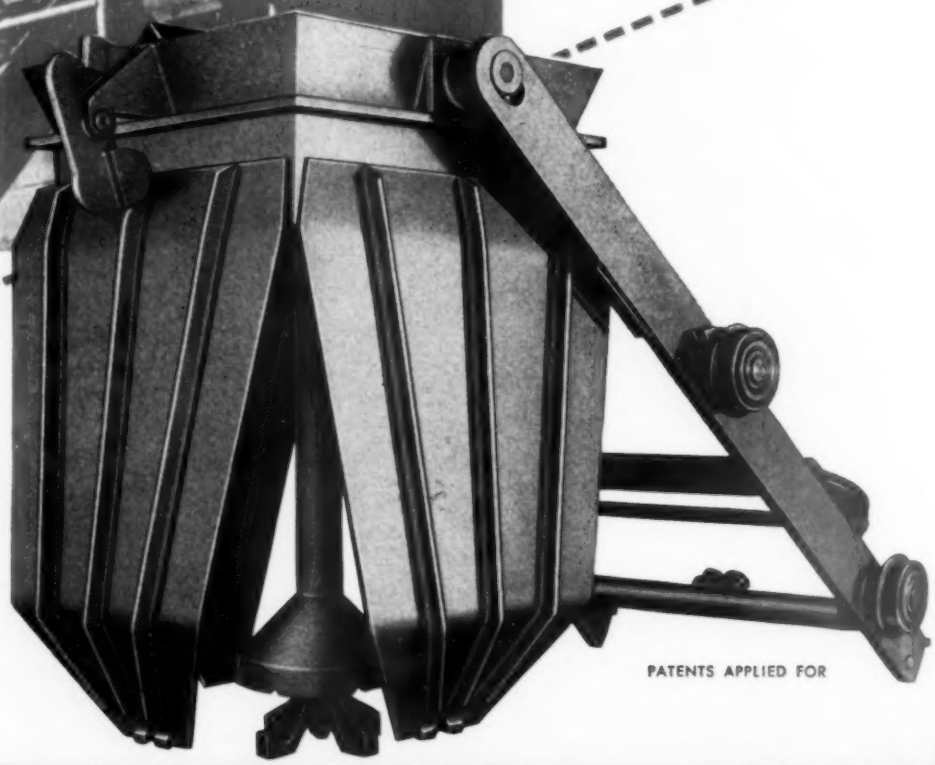
Another FIRST in MODERN Cupola Chargers . . . . . .

MODERN EQUIPMENT CO. *Presents*

The NEW SQUARE-TOP CONE-TYPE SIDE-DISCHARGE Cupola Charging BUCKET



PATENTS APPLIED FOR

This newly developed bucket . . . proven in actual foundry operation . . . is especially recommended for the large diameter cupolas. A *loose center, compact sides* and an *even charge in the stack* are the result of the newly designed *small center cone* and the *large side-discharge doors.* The air penetrates to the center of the stack, a condition which produces higher melting rates.

For further information on the new Square-Top, Cone-Type, Side-Discharge Bucket ask the Modern Representative in your territory, or write—

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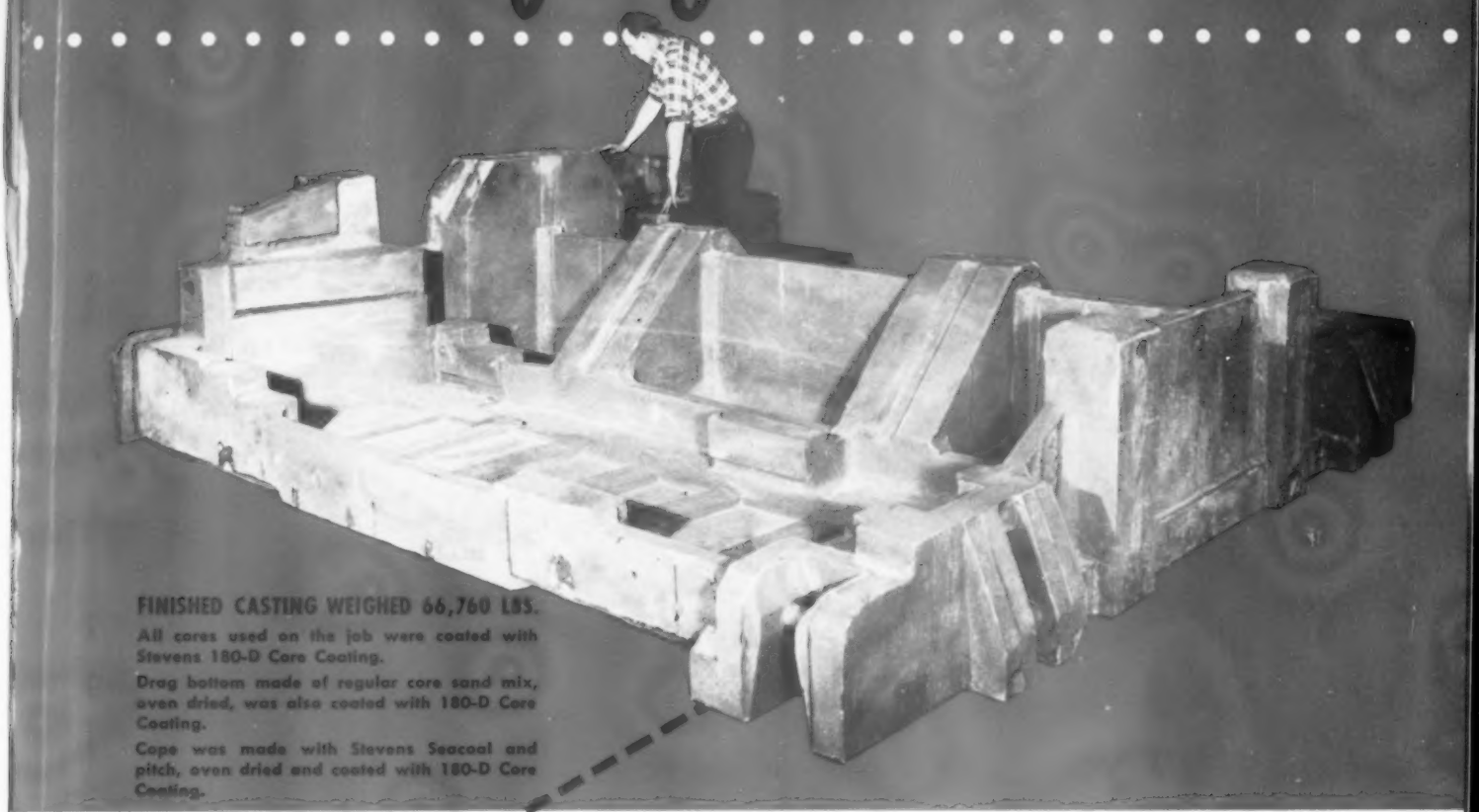
No room for guess-work here!

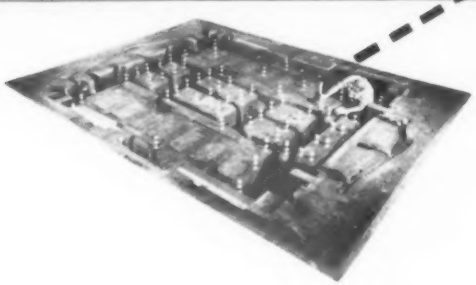


FINISHED CASTING WEIGHED 66,760 LBS.

All cores used on the job were coated with Stevens 180-D Core Coating.

Drag bottom made of regular core sand mix, oven dried, was also coated with 180-D Core Coating.

Cope was made with Stevens Seacoal and pitch, oven dried and coated with 180-D Core Coating.



The Stevens "Job-Qualified" Foundry Facings used in producing this 33 ton Casting had to be just right!

The old saying, "never send a boy to do a man's work," was never more true than in the application of core and mold coatings to "special" casting jobs such as are regularly turned out by Central Iron Foundry Co. of Detroit.

The technical and highly specialized nature of such operations permits no room for guess-work in the proper application of foundry facings. Nor does it permit the least deviation in the quality of the materials used. For more than half a century Stevens "job-qualified" foundry facings have dependably met such exacting demands—are meeting them today.

The dependable *uniform quality* of all Stevens facings, is insured by rigid *laboratory control* every step of the way. Production volume of foundry facings warrants the purchase of ingredients in carload lots, where lowest possible material costs permit us to pass along savings reflected in the price of finished facings. Our modern mill operations are so completely mechanized as to virtually eliminate the human factor in producing these *quality-controlled* products.

Whenever and wherever recommended for your use, Stevens foundry facings will be *right—right* in quality, *right* in better job performance.

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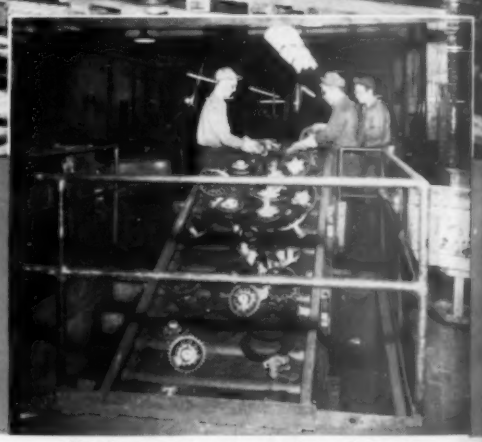
FOUNDRY EQUIPMENT AND SUPPLIES DIVISION

Mechanization doubles capacity at MINNEAPOLIS-MOLINE, *in the same space*



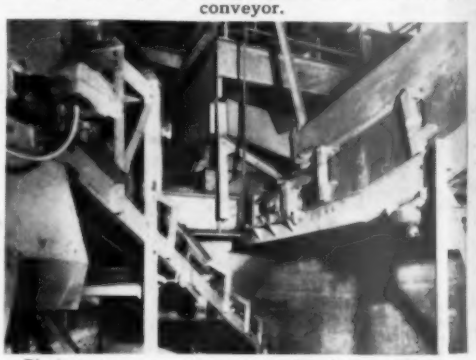
Castings apron conveyor from shakeout.

Link-Belt foundry mechanization layout and equipment in the Minneapolis-Moline farm equipment plant near Minneapolis, not only more than doubled the production of castings in the same floor area (with consequent overall reduction in unit cost) but made the foundry a more pleasant place to work, plus other advantages.

Roller type of pouring floor is used because of variation in size of work produced, and lack of continuous metal. After being poured, the molds (sand and castings) are dumped over the ends of the gravity roll conveyors. Hinged doors covering these openings form chutes when raised for discharging sand and castings onto a Link-Belt oscillating conveyor. The oscillating conveyor discharges the sand and castings onto a shakeout screen; castings are delivered to the cleaning room by means of a Link-Belt apron conveyor while the sand is returned to the sand conditioning system by means of magnetic belt conveyor, and elevator. Photo at top of page shows the Link-Belt sand distributing conveyor, molders' hoppers and gravity roll conveyors.

Link-Belt engineers have solved hundreds of foundry mechanization problems, with high efficiency layouts and standardized equipment. We'll be glad to consult with you.

Floor openings for dumping molds to oscillating conveyor.



Shakeout, apron conveyor and belt conveyor to sand conditioner.

LINK-BELT COMPANY 11.298

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